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ABSTRACT

This study examines the persistent gap in educational attainment and resources between the children of the rich and the children of the poor. Three areas are studied: (1) the causal relationships producing a relatively constant gap in resource allocations and educational attainment (years of schooling) which favors the advantaged; (2) why this pattern of distribution has been impervious to government efforts to increase equal educational opportunities and equal social benefits for the poor; and (3) the likely impact of current policy initiatives promoting educational equity. Section one of the study presents an overview of the problems under consideration. Section two outlines the values and group interests that are at stake in the contest for educational resources. Section three presents data on "who" (i.e., what social groups) wins in the contests for educational resources, where winning is indicated by higher levels of educational attainment. Section four describes systematic patterns of educational resource allocations. Section five presents the outline of a dynamic model for simulating resource allocation and the factors that contribute to the educational systems' documented distribution of resources and benefits. Section six, "Policy Testing," describes the procedures and results of preliminary testing of the model. Figures and tables present data on educational resource allocations and their effects on educational attainment. Appendices present figures obtained from the preliminary testing of the model, model equations, definitions of terms, and over 70 references. (JD)

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FINAL REPORT

The Contest for Educational Resources
A Dynamic Theory of Equity

Submitted to
National Institute of Education
Department of Health, Education, and Welfare
Washington, D.C.

Educational Equity Research
Grants Program

October 20, 1980

Boston University School of Education

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PREFACE

This is the Final Report of a study designed to illuminate the causes of a persistent, century-long gap in educational resources and educational attainment favoring the advantaged as these are distributed by the educational system. Our intent was to understand the causes for, and the policy-implications of, the American educational system's demonstrated ability to increase educational attainment and resources for all social groups while still maintaining a persistent gap in educational attainment and resources between the children of the rich and the poor.

Research focused on formulating a set of theoretical propositions aimed at explaining the persistent gap in educational attainment and resources across social and economic groups. These propositions were then formalized into a computer simulation model for testing and refinement. That model was then used to examine a selected number of policy interventions designed to lessen the gap.

Work was done by Dr. Timothy Weaver and Dr. Alan Gaynor, both of Boston University's School of Education, with technical assistance from Dr. Barry Richmond, formerly with the System Dynamics Group of the Alfred P. Sloan School of Management at the Massachusetts Institute of Technology, and now with the Resource Policy Center at Dartmouth College.

In addition to the work performed by Weaver, Gaynor and Richmond, contributions were made by Ross Zerchyckov, Research Associate, Institute for Responsive Education, Boston University, who provided a critical review and editorial assistance, and Karl Clauset, graduate student, Boston University, who assisted with computer input. The bulk of the typing of this report was performed by Dorothy Linick of Malden, Massachusetts.

1.0 INTRODUCTION

The theoretical focus of this study may be termed, "contest for educational resources." The term "contest" implies that, given finite educational funds, the competing claims of special interest groups will inevitably produce a series of trade-offs, both among the needs of separate groups of the disadvantaged, and also between those groups and the advantaged. Historically, the resolution of such contests have persistently favored the advantaged. This is so despite repeated public policy efforts to expand access to education to all social groups in the population and, lately, to weaken the determinant effects of family background on schooling attainment.

The phenomenon to be explained in this study is differences in allocations of public funds for schooling between upper and lower social classes, a phenomenon which is made inevitable by differences in levels of educational demand and attainment between upper and lower social classes. The dynamic of "Zoom," identified later (Section 4.4) whereby, roughly, increases in attainment at one level of schooling put pressure on expanding the capacity of the next level, is causal, in our view, in generating demand "pressures" to increase allocations. Zoom, however, does not by itself explain patterns of resource allocation (until and unless those "pressures" generated by Zoom are embodied in interest groups who successfully translate their claims for more resources into a new distribution or redistribution of public funds). Although we believe that such pressures are embodied in interest groups seeking to further their claims on educational resources, and that is exactly how new distributions or redistributions of public funds for schooling take place, we have not attempted to explicate the political process whereby interest groups actually translate claims into budgetary actions. We leave this task for future efforts.

1.1 PURPOSE

The historical pattern of the resolution of contests for educational resources is constituted by two phenomena: a rising trend in educational attainment and resources for all, including the most disadvantaged social groups; and, simultaneously, a persistent gap in educational attainment and resources between the children of the rich and the poor. The questions addressed in this study may be stated thusly: What are the causal relationships which produce the persistent tendency of the educational system over time to maintain a relatively constant gap in resource allocations and educational attainment (years of schooling) which favors the advantaged over the disadvantaged despite the rising trend in educational attainment for all groups in the society? Why has this pattern of distribution been impervious to government efforts designed to increase equality of educational opportunity, and, hence, presumably, equalization of social benefits for the poor? What, given an analysis of the structural forces causing the relatively constant gap in educational resources and attainment, is the likely impact of policy initiatives promoting educational equity that are currently under consideration?

Clearly, all three questions are interrelated. And, answers to the latter two are contingent upon answers to the first, i.e., identification and analysis of the factors contributing to the persistent class-bias in educational attainment. In this study, our focus is on formulating a set of theoretical propositions aimed at explaining the persistent gap in attainment and access to educational resources* across social and economic groups.

*"Access to educational resources" refers to a social group's ability to press for allocations of educational monies in order to meet their particular objectives, e.g., middle class efforts to increase BEOG's eligibility for families with children in college; or the efforts by the poor to increase various forms of compensatory education at the elementary and secondary level. Embodied in the "ability to press for allocations" are, at the local level, such factors (continued)

1.2 THE POLICY ISSUES: DILEMMAS OF LIBERAL REFORM

1.2.1 The Gap in Educational Attainment

Several historians have observed that the general character of the educational system has been to benefit the most economically advantaged first and only after that the least advantaged (Karier, et al., 1973; Karier, 1975; Katz, 1968, 1970; Tyack, 1975). As the schools have turned to correcting inequities by providing education for the disadvantaged, the advantaged group seeks higher levels of educational attainment. For example: as the poor began to attend common schools, the upper classes increased their own proportion in the high schools; as the poor began to attend high schools in large numbers, the upper classes increased their own proportions at the college level. The net result is that the poor and the upper classes are represented in about the same proportion in college today as they were in high school in the 1880's. Because children of the affluent stay in school longer (i.e., have higher attainment levels) than the poor and because their schools spend more, children of the affluent receive about twice their share of public educational resources (Jencks, 1972). The gap in relative attainment has

as differences in family abilities to invest or tax themselves more heavily for schooling; at the state level, political action to seek equalization of per pupil expenditures between school districts; and at the federal level, increased expenditures which recognize unequal needs which stem from social and biological origins (e.g., ESEA Title I, Bilingual Education and Education for All Handicapped). We will argue that each of the social groups representing these interests will at one time or another succeed in enlarging that group's level of support. Relatively speaking, however, we will also argue that while the "contest" for budgetary support--particularly at the state and federal level--tends to be cyclical, the interests of the middle and upper classes ultimately "win" in budgetary terms, and the evidence we offer is the constant gap in funding and the constant gap in attainment. Despite two decades of substantial gains in federal support for the disadvantaged and handicapped, even greater gains occurred in federal support for colleges and universities.

changed little during this century. It has merely shifted to higher levels of the educational system. It follows, a fortiori, that the gap in educational resources as distributed between upper and lower social classes has changed little (if anything the resource gap has widened due to increasing expenses of advanced education relative to lower levels of schooling).

1.2.2 Equity and the Dilemmas of Liberal Reform

The equity issue arises out of the inescapable nexus between educational attainment and social benefit accruing to different groups achieving different levels of educational attainment. If the education system did not provide social advantages for the privileged, and substantial opportunity for the poor, or if educational attainment produced no tangible benefits for anyone, then the inequality dilemma would be irrelevant. It would matter little whether everyone had identical credentials and skills or no credentials and skills. The driving force behind the inequality dilemma is that attainment is believed to be decisive in life success. The equity issue arises not simply because it is believed that the privileged have unfair advantage in school but because it is believed that advantage translates into unfair economic advantage later in life. One could probably imagine a schooling system which did not favor one social class over others. Indeed, schooling could be so arranged as to prevent any class advantage (for instance, as suggested by lottery attendance, or by not awarding credentials at all). That schooling is not so arranged is significant.

That schooling has been so distributed as to increase the level of attainment for all while preserving the relative advantages of the upper classes is also significant. It suggests, for example, that the persistence of inequality is not the result of liberal reformers failing to reform. Indeed, the record shows reformers have been enormously effective in providing substantial opportunity to the underprivileged

through schooling. What we will argue is that while the education system has provided substantial opportunities for the underprivileged, these opportunities are cancelled, in effect, by very large offsetting opportunities offered to the privileged. The education system in this sense serves to maintain equilibrium. It does so by not allowing educational opportunities to compensate, for long, the disadvantages of the underprivileged in any manner that would injure interests of the privileged.

This is the key question in our whole project: If government, as Diane Ravitch (1978) puts it, "can try to neutralize social differences by subsidizing tuition, but it cannot (or at least has not) actually penalize children from advantaged homes as a means of advancing equality," then can inequality be eliminated? We think not. To what extent should government neutralize what is distinctly an unfair advantage of educated upper income families, i.e., "educated parents are likelier to implant higher educational aspirations in their children and are more capable of paying for advanced education than are those parents who have little education and low income (Ravitch, 1978)?" Leaving aside, for now, the "should question" our analytical focus is on the consequences of unwillingness on the part of government to transgress this sanctuary of the privileged. The result, we will show, is a century of repeated reform efforts which have little weakened the determinant effects of family background on schooling attainment, and have not altered the relative distribution of economic benefits that are presumed to be connected to schooling outcomes. But it is not due to a failure of reform effort to provide more opportunities for the poor. The dilemma is that educational inequality is reproduced in each generation by a system of schooling through which government succeeds at giving alms to the poor and rich alike.

1.3 RESEARCH ISSUES: NEED FOR A SYSTEMS MODEL

Explaining the co-existence of an expansion of educational opportunity to the disadvantaged with the persistence of a stable pattern

of class-determined educational inequality constitutes the research problem of this study. The research and the policy problems are, of course, not unrelated: a resolution of the research problem can illuminate the policy dilemmas identified immediately above.

The approach taken here is to, first, conceive of the contest for educational resources as being embedded in an educational system, the word "system" being used in a specific and technical sense. Second, based on an understanding of the structural properties of schooling qua "system," we apply a system dynamics perspective and construct a computer simulation model which, in effect, represents a composite of the effects of existing policies.

1.3.1 Definition of the Educational System

We mean here to define as the "Educational System" the commonly recognized arrangement of schools, colleges, and universities, from kindergarden to graduate school, also as known as and used in the text of this study, as the "Schooling System." This definition not only carries the imprimatur of legal standing but also a theoretical presumption of organic wholeness (cf. James E. McClellan, 1968). The activities of the various member parts of the systems must be recognizable, exchangeable, and acceptable by the whole. What effects one part must eventually affect the others. The system of schooling institutions, taken as a whole, must be differentiated and distinguished from other forms of education, i.e., when one is asked, where were you educated?, the common reply will be some particular school or schools. This definition would not exhaust the total arrangements for education and obviously omits highly formal job-training in business, industry, public service and the military, and a vast array of adult education activities and informal learning arrangements for children. Thus, we are concerned with that system commonly called schooling, but only those institutions of schooling, kindergarden through graduate school, which stand in mutual interrelationship. Excluded would be

most forms of strictly proprietary schools and the various unaccredited sectarian and cult schools. It seems indisputable that much education, perhaps most, takes place outside of this system. The question of whether the most important forms of education take place inside of this system is left open. The key here is to identify, as within the boundaries of the model, that part of the total arrangements for education which can be influenced by political action, and which constitute, not a nominal definition, but rather, an organic definition tied to functional properties.

The formal education system has become, with certain notable exceptions (e.g., Mafiosa), the singular avenue of hope for waves of underprivileged Americans seeking advanced social standing. But it is not enough that people simply hold a belief in the efficacy of schooling. It must also be the case that educational benefits are actually attainable by a sufficient number of persons to cause everyone to believe the goal is reachable, and it must be the case that the benefits are, indeed, real benefits. In short, there must be some actual connection between one's investment of time in schooling and one's relative advantage in the occupational hierarchy. Institutions other than education must do more than simply concur. They must act in a manner which fulfills the prophecy. Enough employers must hire and reward persons according to differences in educational preparation so as to validate belief in the benefit of schooling and to convince succeeding generations that spending nearly one-third of their lives in school is worthwhile. The most recent work of Jencks (1979) provides a clearer picture. Education pays most to those who can afford most--white males from educated families with above average incomes. After controlling for background, education payback is meager at the high school level but higher for those who complete college, suggesting that employers do prefer better educated employees.

1.3.2 Advantages of a Systems Dynamics Perspectives

The manifest advantages of the systems dynamics perspective stem from several key characteristics of that approach.

First, it forces attention on persistent regularities, in this case, the maintenance of an upwardly shifting, class-biased gap in educational attainment, as embedded in, and contributing to, maintenance of other regularities. For example, the educational system depicted in Section 1.3.1, above, is itself a subsystem of the larger American social system constituted, in part, by a class structure of income inequality based partly on achieved job status and ascribed benefits of inherited family advantages. The dynamic tendency of the American educational system to allocate resources so as to expand opportunities while maintaining the attainment gap serves an important social function. It has the effect of reaffirming an economic order dominated by the upper social classes. That function is served by an allocation of financial resources over a long period of time so as to allow scarce educational credentials to be claimed by the privileged, and non-scarce educational credentials to be the outcome for the under-privileged.

The dynamic works in favor of the economically advantaged in three ways: (a) they are the first successful entrants at any given level of the schooling system and thus they acquire more advanced educational credentials than others (we estimate that when no more than one-fifth of the population gain entry to a given level, the odds will favor the affluent by about 8 to 1); (b) those same credentials, when in scarce supply, have greater economic value for the privileged than for those who later acquire them as non-scarce goods; and (c) advantages accrue to the privileged who, although not entirely so, have higher educational aspirations, are more likely to have relevant educational attributes, and are better able to afford advanced education, financially and psychologically.

The long-term distributive tendency of the education system is to maintain relative parity in schooling resources and subsequent economic benefits for American offspring in accordance with family socioeconomic rank, and in so doing the social objective of the schools has never been to eliminate inequality altogether, rather to prevent it from reaching politically unacceptable levels. By its function within a social system that, in Stephen Thernstrom's (1973) words, offers "substantial privileges to the privileged and extensive opportunity for the underprivileged," the education system contributes to a solidification of the social order. We reason as follows: The education system has always been structured so as to oversupply persons with skills and credentials relevant to employers at one level, making educational attainment more equitable but less valuable, and in so doing providing employers with ample choices in the labor market. But at another level, the system undersupplies persons with relevant educational characteristics making the social distribution of those credentials less equitable and more valuable, and to employers, more scarce. Our hypothesis seems to be verified in Jencks, et al., (1979:190):

Furthermore, while the distribution of elementary and secondary education has become considerably more equal, the distribution of higher education has become somewhat less equal. Since higher education has more impact on earnings than elementary or secondary education, at least for those who complete college, the increasingly unequal distribution of higher education may more than offset the effects of equalizing the distribution of elementary and secondary education.

It has ceased to be the case that high school completion determines, in any particularly strong economic sense, status as an adult. Jencks, et al., (1979) state:

Our results suggest that the apparent advantages enjoyed by high school graduates derive to a significant extent from their prior characteristics, not from their schooling. Unless high school attendance is followed by college education, its economic value appears quite modest.

The skills and credentials conferred by high school graduation have simply become non-scarce goods no longer distinguishing persons

competing for positions in the labor hierarchy. The goal of high school graduation has been transformed. It is no longer to claim significant and immediate economic benefits but rather to "qualify" for the next highest level of schooling.

Second, a systems approach takes an internal focus; that is, it assumes that structure causes behavior. This methodological bias is especially useful in explaining the persistence of a documented regularity--gaps in educational attainment--despite repeated efforts, i.e., educational expansion, reform, and "compensatory education," to change that regularity. The literature on educational inequality and reform suggests, but does not adequately explain, the pattern of interrelationships that generate cumulatively the dominant tendencies of the educational system (Katz, 1968, 1970; Karier, 1975; Karier, Violas and Spring, 1973; Tyack, 1974; Carnoy and Levin, 1976; Spring, 1976; de Lone, 1979). This literature is full of the shortcomings of educational reform. To borrow from one source, not only has the system of education "failed to educate but its reformers have failed to reform (Carnoy & Levin, 1976)." Yet, the literature is barren of a theoretical model which explains why failure reoccurs (with the important exception of Green and Haynes, 1972). The logic of systems dynamics, i.e., the internal focus on structure as a cause of behavior, can provide such a theoretical model if we conceive of "reforms" as external inputs.

The internal focus of systems dynamics stands in contrast to a traditional view which sees external forces as causing behavior (system as effect). In system dynamics the structure is a closed loop structure, whereas traditional management models assume an open loop structure. The difference is critical. Closed loop structures are feedback structures; open loop structures are models of linear effect. An emphasis on feedback structures can provide explanations for regularities seemingly impervious to intervention. Work in as seemingly disparate fields as biology (Richmond, 1977), criminal and civil justice (Collins, 1976; Shaffer, 1977), psychology (Wegman, n.d.) and economics (Forrester,

et al., 1976) suggest that inherent structural differences yield characteristic behavioral differences and that characteristic patterns of behavior tend to be relatively insensitive to the nature of input. Rather, it seems, whereas input is needed to precipitate response, the fundamental nature of the response is the same regardless of the input. Such a systemic, inward focus is missing from the vast majority of government-sponsored policy research on educational inequality which has been dominated by the hope of reproducing successful models for reducing the achievement gap between social groups, by a single research model (school as a production function), and by repeated efforts to refine and test the linear effects of schooling on achievement variance (cf. Coleman, 1966; Bowles, 1969; Hanushek, 1970; Jencks, et al., 1972, 1979; Averch, et al., 1975).

Although these projects have enlivened educational policy debate, the consequence has been a frenzied repetition of effort to discover more specific disaggregative effects of schooling where none was produced before. Missing from the debate is an overall explanation of systemic relationships which over time tend to produce a relatively constant distribution of educational resources, educational attainment and subsequent social benefits favoring the advantaged. Despite a commitment of financial and educational resources designed to correct the imbalance, the disadvantaged have been persistently disfavored throughout this century, and if revisionist historians are correct, since the beginnings of the public schooling system in the nineteenth century.

Third, a systems approach permits the construction of "closed" models. The advantages are two-fold. For purposes of an analysis, a systems model, by drawing boundaries and making specific distinctions between endogenous and exogenous variables, makes explicit the ceteris paribus assumptions implicit in all social explanations. For purposes of policy analysis, the model's boundaries are coterminous, roughly, with the jurisdiction and authority of policymakers. For

example, the social benefits of different levels of educational attainment are dependent, in part, on the labor market for school credential holders, on changes in the composition of the workforce (e.g., service vs. production employment), and on employers' valuations of credentials. These factors are not immediately susceptible to intervention by education policymakers. Hence, the focus in our model is on intra-systemic causes of changes in levels of educational attainment.

Finally, a model of system dynamics is a helpful policy analysis tool in that by expressing effectively a set of relationships believed, on the basis of the best knowledge available, to be theoretically sound, and reproducing patterns of behavior known to be historically associated with the real world system the model allows us to evaluate policy alternatives based upon the behavior of the model. In fact, the justification for model building rests with the eventual ability to test policy interventions. For example, what would be the expected long term effects on attainment given additional resources such as Title I monies or additional funds for the Bi-Lingual Education Act? To relate that question to a policy question recently under consideration, former HEW Secretary Califano, as reported in Education, U.S.A. (May 1978), requested information on the impact of increases in Title I expenditures (adding \$300 million, \$600 million, or \$1 billion). The impact of such increases would be testable in this model against the structural dynamics of the education system, and the expected overall effects on target groups observable. If our assumptions are correct, the effects will be minimal, but one of our primary objectives is to learn more about how the system resists efforts at reform.

To consider another example, for nearly a century, despite whatever proportion of graduates from high school enters college, bachelors degree completions have remained a relatively constant ratio of high school diplomas five years earlier (Byrnes and Folk, 1970). What relative changes in resource allocation to higher education would be expected if that function were to be altered, as might be anticipated

given a national choice consistent with the decision in the 1930's to make high school attendance universal? What would be the implications for minorities and women, given historical rates and levels of college attainment? What would be the trade-off in lost opportunity costs for the elementary-secondary schools, particularly in urban areas struggling with the enormous costs of racial integration and least restrictive treatment for the handicapped?

1.4 AIMS OF THE STUDY: RE-STATED AND REFINED

In summary, given the background of policy concerns and methodological premises presented above, the aims of the study may be restated as follows:

- (1) Refine and test theoretical assumptions regarding educational resource allocations to various populations. The assumptions are concerned with the interrelationships among five elements:
 - (a) educational attainment
 - (b) distributive and growth dynamics internal to the educational system
 - (c) flow of funds to levels and programs favoring advantaged and disadvantaged groups
 - (d) influence of family on educational advancement
 - (e) effect of exogenous variables--demographic and economic.
- (2) Identify factors which maintain the persistent inequity (factors which "correct" for policy interventions and maintain the bias of the system which favors the advantaged).
- (3) Identify the limited number of specific points of "sensitivity" of the system where policies and actions might produce lasting changes in educational resources and benefits among social groups.

- (4) Explore the likely impact of policy initiatives for addressing educational equity that are currently under consideration in Washington. Our primary goal is to show as precisely as possible how such policies can be defeated by the structure of the educational system, or why the system is insensitive to policy interventions, and then to discover how such initiatives might be redesigned so as to render the system more sensitive to positive intervention.

1.5 DEFINITIONS

Further understanding of the study's aims and its results as contained in this Report, requires a definition and explication of the following terms as underlined in the text immediately, above.

(1) "Educational Resource Allocations." By "educational resource allocation" we mean in general expenditures from all revenue sources, for education at all levels, and by implication all of those "goods," in an educational sense, that money can buy. It follows from our definition of the "educational system" (Section 1.3.1) and from the public policy focus of this study that educational expenditures and revenues of most concern will be those over which public policy makers have direct control. Special attention is paid to expenditures and revenues derived from federal sources. Because of the nature of this study, as embodied in the modelling work (discussed later in Section 5.0), we look at the totality of educational resources (defined as percentage of GNP devoted to all levels of education, public and non-public (as calculated by Bureau of Economic Analysis, U.S. Department of Commerce). We estimate that about 80% of all educational expenditures (\$141 billion in 1977) are derived from public sources (see Digest of Educational Statistics, 1979, Table 16). Yet, allocations of private monies are important in our understanding of equity. We will argue ultimately that equalization of attainment necessarily entails limiting the means of the privileged to offset opportunities provided the poor,

including the expenditure of private funds. However, apart from the effects of private expenditures, parity in public funds expended on the education of upper and lower social classes constitutes an unfulfilled goal of American policy. It is that lack of parity in public expenditures that we refer to as the "resource gap." We offer, for the purposes of this study, a parameter of that resource gap estimated by Jencks (1972) and cited earlier: due to their staying in school longer and their schools spending more on a per pupil basis, children of upper income families receive about twice over their share of school funds as compared to lower income children.* We estimate (see Table 3D, Section 3.2.4) that children of families headed by well educated parents (one standard deviation above the mean of all parents) receive about 150% of average school expenditures and those of poorly educated parents (one standard deviation below mean) receive about 70%. We recognize, of course, that at the college level a higher proportion of this advantage is represented by private costs (tuition, books and endowments). We do not include lost opportunity costs (wages, salaries) or return on college funds if invested. But it is important to realize, however, that even with proportionately higher private costs, public taxes constitute about 50% of all revenue sources for institutions of higher education, public and non-public.

(ii) "Educational Attainment." At its simplest level of meaning "attainment" refers to credentialed, certified completion of a given level of schooling. But there is no necessary or logical connection between expanding participation in the school system and a rising level of "educational attainment," except when such attainments were not possible through other means or when attainments are defined solely as time spent in school. Expansion of the schools would have no necessary bearing on educational attainment if attainment were defined as one's "total store of knowledge, wisdom and skills." Certainly,

*The work of Hansen and Weisbrod (1969), plus additional analysis by Pechman (1970) and Hartman (1970) as reviewed in Rivlin (1971) reinforces this contention. The middle and upper classes are the greatest gainers, at least in California, of public subsidy of higher education.

some of these would be related to time spent in school but by no means all. In some cases, we might well expect to find an inverse relationship. Consider the Yoder case in which it was argued that time spent in school would be detrimental to transmitting the basic cultural and religious precepts of the Amish. The U.S. Supreme Court agreed and allowed Amish children to leave school prior to age 16. Despite the obvious differences in abilities and speed with which children could theoretically master the school curriculum, all or nearly all are within a few months of being the same exact age when they do--or at least when they are certified as having completed school. Under such conditions it becomes merely tautological to argue that educational attainment and school leaving are correlated. But a rise in attainment does not mean necessarily that schooling has expanded, nor for that matter that achievement (measured skills and knowledge) has risen. In fact, the system can shrink (as at present) while average attainment rises and achievement (i.e., SAT, NAEP scores) declines. Nor is it quite correct to say that expansion necessarily means rising attainment levels because some people could simply study some things for longer periods of time at any given level (as implied by the competency testing movement), or more people could study things within the system for which credits are not awarded (as in adult education). Also keep in mind that the average attainment level for all adults, 25 and over, will only be affected in a minor way by fluctuations in each particular age-cohort's average level of schooling, and then only five years later (the mean school leaving age being approximately 20 years). Adult average educational attainment is a product of (a) size of cohort, (b) ratio of school completions per cohort, and (c) demographics. With regards to (c), average educational attainment for all adults over 25 rises as the oldest, and least educated expire, even if rates of participation in schooling by the young were to remain constant. Rates of successful completion, at all levels of the system could freeze at current points, but overall average attainment for the society would

rise as the least educated die first (except in unusual cases such as war). It is also true that a very large influx of young cohorts into adult statistics would affect those statistics upwardly even if each of the entering cohorts averaged only the level of schooling possessed by immediately succeeding groups. In other words, a freeze on attainment levels of cohort groups 1...n will still mean an increase in average adult attainment simply because their percentage increases relative to older, less educated cohorts.

It would also be the case that a rapid increase in ratio of high school completions would not much affect average attainment for all adults in the short run, and not even in the long run if those cohort groups were very small. They were relatively small from 1944 to 1959. Thus, the average education attainment for all adults in the United States, 25 and older, rose only from 12.1 years to 12.6 years over the period 1950 to 1970. In part, the small effect was due to smaller graduating classes, despite the fact that a higher percentage within each class graduated.

(111) "Disadvantaged." No matter how one defines "disadvantaged," from the point of view of the schooling system the definition will have something to do with the amount of resources available, the amount of time required to acquire certain prescribed skills, attitudes toward educational advancement, and knowledge relative to others. Inevitably these will be expressed in terms of the majority culture and, as a result, those who are most economically disadvantaged are also most likely to be educationally disadvantaged.

For the purposes of this study, "disadvantaged" will be defined as including Blacks, women, Hispanics, American Indians, the handicapped and the economically impoverished. In order to define a general model parameter which adequately represents the disadvantaged groups specified, upper and lower family education attainment was initially used as an operational definition. Education as a "proxy" was

chosen because the educational attainment level of heads of households is readily available and that distribution reveals very large concentrations of the disadvantaged target groups among the lowest educated families and a relative scarcity of such groups among the highest educated families.

(iv) "Persistent Inequity." Although we define "equity" and "inequity" in some detail in Sections 2.1 and 3.1.1 it is important to set forth here the use of our term, "persistent inequity." First, we wish to argue that on the one hand, the polity of education is constituted by a norm of the good, "equity," derived from the liberal-meritocratic ethos--"careers open to talent." But the educational polity's distributive processes on the other hand are governed by a contrary value of "efficiency" based on the utilitarian assumption about the possibility of inheriting (or rather bequeathing) privilege as an incentive for productivity. It is this notion of incentive for productivity, raised by Ravitch (1978) and discussed elsewhere (Section 4.6), that is central to this argument. As long as distributive processes are governed by the belief that families must be encouraged as a matter of policy to exercise the good judgment of investing more if they have more in their children's education because so encouraging families is a necessary condition for motivating and fostering productive efforts, the result will always be a distribution of education more reflective of family's aspirations and incomes than family's natural abilities. Accepting for the moment that equity is achieved, in the liberal-meritocratic ideal, when differences in educational attainment reflect only differences in individuals' natural abilities, the persistent condition of American education has fallen short of its ideal. Entrance to higher education in America today, although less class-biased than two decades ago, still favors sons of upper status families by 2 to 1. That this difference in college entrance is due to class bias and not entirely to differences in natural ability judged necessary for success

is suggested by Michelson's (1973) research (see Section 3.1.2). The term, "persistence," derives from our discovery that approximately the degree of class bias shown in higher education in the past decade can also be seen in the high schools in America in the 1880's. We argue that in a relative sense, the degree of class bias has not mitigated; it has simply migrated--to the next highest level of the system (see Section 3.0).

(v) "Policy Initiatives for Addressing Educational Equity Currently Under Consideration in Washington." A conceptual framework for describing equity and policies initiatives is discussed in Section 2.1. Equity-related policies may be divided into four kinds: (1) those aimed at reducing total population variance in schooling resources as between school districts, (2) those aimed at reducing variance in schooling resources between particular social groups as in school desegregation and education of the handicapped, (3) those aimed at equalizing schooling results (achievement and attainment), and (4) those aimed at reducing variance in social benefits (jobs, income, status) thought to be distributed on the basis of schooling results.

Examples of the first kind of policy initiatives currently or recently under consideration would include those embodied in the proposals of Coons (1970; 1979); Berke (1974) and others, including vouchers, tax incentives, and funding reformulations. Given the outcome of Rodriguez, major efforts to bring federal initiatives to this range of policies have waned. Most of the action now is at the state level. Examples of the second kind of policies, those aimed at variance in resources between social groups, would include a broad range of programs, old and new (Civil Rights, Bilingual Education, Education for the Handicapped, Indian Education, Educational Opportunity Grants). Examples of the third kind of policies, those aimed at equalizing achievement results, are embodied in ESEA Title I. Finally, policies directed at social benefits include both those aimed at providing "readiness" (Head Start) and those aimed at correcting deficiencies in skills (Manpower Development and Training Act; Comprehensive Employment Training Act).

This is not intended to be an "exhaustive" listing of such initiatives but rather an attempt to foreshadow the genre of initiatives that are testable in the model. For a full discussion of those tests and results, see Section 6 "Policy Testing."

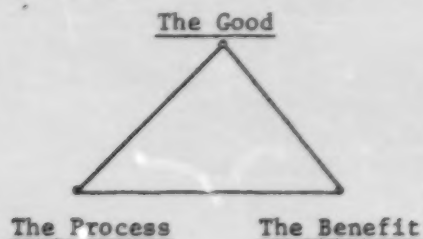
1.6 OVERVIEW AND ORGANIZATION OF THIS REPORT

Section 2, "Background: A Theory of Equity," outlines what values and group interests are at stake in that contest for educational resources. Section 3, "The Benefit: Results of the Contest," presents data on "who" (i.e., what social groups) wins in the contest for educational resources, where winning is indicated by higher levels of educational attainment. Section 4, "The Process: How the Contest is Resolved," describes systematic patterns of educational resource allocations. Taken together, Sections 3 and 4 provide the data base for the theoretical propositions formalized in the dynamic model presented in Section 5. In brief, Section 2 presents an analytical and normative framework for understanding and evaluating the behavior of the educational system; Sections 3 and 4 present data on that systems' behavior in terms of the social distribution of levels of educational attainment and educational resources; and, Section 5 presents the outline of a dynamic model for simulating how that distribution occurs--what factors contribute to the educational systems' documented distribution of resources and benefits. Finally, Section 6, "Policy Testing," describes the procedures and results of preliminary testing of the model. Those tests embody the initiatives described on page 19 ("Policy Initiatives for Addressing Educational Equity Currently Under Consideration in Washington"). Each of these tests entails a particular "switch" or adjustment of table equations in the model so as to simulate the effect of the policy initiative.

2.0 BACKGROUND: A THEORY OF EDUCATIONAL EQUITY

The constitution of a "theory" of educational equity would entail an elaboration and understanding of three paradigmatic elements, The Good, The Process and The Benefit, and, as well, an understanding of the interrelations of these three elements so as to denote the functional nature of the paradigm.* The Good would have to do with the desirability of alternative conditions of equity. It answers the question, where do we wish to go? The Process would address the question, how does our system of politics and economics impinge upon efforts to affect social and educational change through schooling directed at The Good, Equity? We would wish to place emphasis on how the system works dynamically to cause as well as prevent change. Questions having to do with The Process necessarily include alternative policy interventions; structural and dynamic features of the school system itself, and the interaction of such features with the political and economic system; educational imbalances (as between schooling benefits for socially identifiable groups); and lastly, the limits of policy interventions to change such imbalances. The Benefit asks not only for whom is education useful, but for whom is a further change toward educational equity useful?

The paradigm may be illustrated as below.



*We are indebted to Austin Millington for insights regarding this "triadular" notion of equity. Millington's ideas are derived, in part, from his studies with J.L.H. Thomas in Thomas's lecture course, "System and Thought," All Souls College, Oxford University, 1972, and a reading of materials in Weaver's seminar, "Educational Policy Seminar," School of Education, Boston University, 1978, especially the work of Green and Haynes (1972) and McClellan (1968).

2.1 THE "GOOD": EQUITY AND EQUALITY

The denotative meaning of the term, "equity," would be marked by "fairness," i.e., having to do with what is just. In an educational sense, in order to promote equality of result, it might be more just to provide some children with two or three times the amounts of learning resources or teacher time as received by the average child simply because the children in question have greater needs than the average child. That may also be morally right in a universal sense, but the issue we wish to forward has to do with balancing the equity interests and claims of various socially identifiable groups which compete for resources within a political system.* The liberal notion of what constitutes fairness as a matter of equity policies (i.e., "careers open to talent") is discussed in Sections 3.1.1 and 4.4.

The term "equality," on the other hand, denotes an arithmetic concept: precisely like treatment (as derived from the austere construct, x "equals" y) and as such implicates a distinctly different set of policies. In the discussion just below, we will argue that the quest for equal educational opportunity has in fact now become the demand for equitable relief. The provision of equal treatment does not lead to equal results and therefore cannot satisfy the quest of those who have suffered with too little and now lay claims to a greater share of educational benefits. Compensatory education, as noted by Jencks, et al. (1972), is not a solution to the problem of equal educational opportunity but is in fact a response to equity, a realization that equal treatment of all children with unequal needs will inevitably lead to greater inequality of educational results and a greater degree of inequity. It is clear that those who wish to promote equal educational

*Educational policies regarding the handicapped rest on the principle of equity and are widely accepted as necessary and just. It is our view (Weaver, 1977) that equity policies gain greatest expression when the evidence of need to be balanced through the distribution of school resources is more or less stochastic and therefore resources may be distributed without regard to social markers (the term, "markers," used by Douglas Rae (1979) to signify various identifiable social groups).

opportunity through compensatory education do not wish to cause greater inequality of results. The opposite is their concern. While the literature, perhaps in some sense, as implied by Jencks, continues to bear the label, "equal educational opportunity," for political reasons, its connotative meaning has to do with equity.

Levine and Banes (1975) have suggested that the quest for "equal educational opportunity" implies one or all of the following: (a) eliminating poverty, presumably by eliminating inequality in the benefits associated with education; (b) enhancing cognitive skills among the poor, presumably so as to eliminate inequality in the conditions of schooling, and subsequently, in life chances; and (c) redirecting educational reforms toward one or both of the above. At issue is the exact nature of these goals, what is desirable for whom, i.e., The Benefit, and whether accomplishment of one or all three of these would be, in a proximate sense, to accomplish The Good, i.e., Equity. A further question exists as to whether it is the proper function of schools to do these things, and whether, even if it is the proper function of schools, the limits of policy intervention through the schools can make good the promise to accomplish them. The latter would be a question having to do with The Process.

Inherent in Levine and Banes' interpretation of the intents implicit in "equal educational opportunity" claims are four kinds of equality goals. These include:

- (1) goals promoting equalizing of shares (as in equal access to schooling resources) which we define as equal educational opportunity, or marginal equality;^{*}
- (2) goals aimed at equalizing benefits which we define as equality in outcome measures associated with education, or global equality;
- (3) goals to reduce total variance on some educational measure (such as cognitive skills, or educational

^{*}Douglas Rae (1979) makes these distinctions (those we have underlined), although our interpretation may be slightly different than Rae's.

attainment), or some subsequent benefit thought to be associated with one or both measures; these reductions in total population variance we call simple equality; and

- (4) goals seeking to reduce the incidence of educational inequalities associated with identifiable groups, which we define as emancipatory equality.

These four goals form the basis for understanding what we operationally mean by equality, and importantly they call forth quite different educational policies, and quite different benefits as illustrated below.

	Marginal Equality (equal shares)	Global Equality (equal results)
Simple Equality (Total Variance)	Policy (1)	Policy (3)
Emancipatory Equality Between Group Variance)	Policy (2)	Policy (4)

Policies No. 1 would be aimed at (a) the condition of unequal shares by reducing the total population variance in schooling opportunities, but (b) at the same time distribute school resources in such a way that individuals benefit by receiving equal shares (those who are in school receiving an identical share) without regard to unequal representation of social markers among school populations. Such policies give equal shares to individuals with unequal needs, e.g., it may be the case that children of migrant workers would receive no schooling benefits but that would not properly be a concern of such policies. Examples of such policies would be those urged through Rodriguez and other cases having to do with equalizing district expenditures. These policies address the equity issue only by eliminating the double-jeopardy whereby, typically, those who need more (e.g., children in

low-income communities) get less (e.g., low tax-wealth school districts spend less per-pupil).

Policies No. 2 would be aimed at (a) the condition of imbalance in resources distributed among social markers represented in the schooling population, but would (b) distribute resources in such a way that the incidence of inequalities are spread evenly across groups--ignoring the fact that wide ranges of need exist within groups and that results would vary greatly. Examples of such policies might be found in the remedies of school desegregation where it has been held by the courts that assignment of Blacks and Whites to different schools is inherently unequal but wide differences in educational needs are ignored (it should be noted that there are exceptional cases, such as the Garrity decision in Boston, where additional remedies recognized differences in educational needs).

Policies No. 3 would seek to (a) reduce total population variance in educational opportunity by (b) reallocating resources so as to equalize educational benefits (attainment and social advantage). This is difficult if not impossible to achieve. Policies of this type, e.g., compensatory, targeted education programs such as ESEA Title I or P.L. 94-142, recognize that unequal needs require unequal shares in order to realize real equality of opportunity.

Policies No. 4 would aim at (a) ensuring that representative students from different social groups have identical attributes, i.e., equal "readiness" in terms of aptitude, interest, and aspiration to take equal advantage of schooling resources which (b) would guarantee equal results among representatives of such students in both educational measures and subsequent life chances. Achievement of this equality goal requires massive amounts of educational resources for compensatory education, and measures to defeat the unequal effects of economic institutions in providing opportunities to members of different

social groups. Examples of such policies attempts include those mentioned above in (3) plus a range of policies directed at early childhood development (Head Start), policies aimed at the persistent unemployment of the disadvantaged adults (CETA), affirmative action laws (Title IX of the Civil Rights Act), and such actions as the recent court orders upholding affirmative action policies of a private corporation.

Policies aimed at emancipatory equality do not lead necessarily to a reduction or eradication of simple or direct inequalities in resource allocation but to an equalized incidence of such inequalities over socially identifiable groups. Likewise, the pursuit of simple equality may not necessarily be associated with any progress toward emancipatory equality.

With regard to marginal and global equalities, government may seek to achieve equality within the sectors it touches (marginal), or it may attempt to promote through those sectors equality in social and economic life (global). These views of government role lead to distinctly different policies: marginal policies would lead to equal resource allocations and global policies would lead to unequal resource allocations designed to make up for unequal conditions stemming from social origins. We will argue in Section 4, "The Process," that the drive for equality is from marginal to global, and that the expectation is that government institutions should promote equality in society understood globally. Once society is committed to global equality, whenever inequalities generated in the "ungoverned" sectors (e.g., real estate markets) impinge upon equalities sought by public institutions (racial balancing in pupil assignments), the only recourse is compensation. That recourse is inherently unequal in a marginal sense (the distinction between equal opportunity and equal results discussed earlier).

This distinction, i.e., equal opportunity vs. equal results, implies two different and very important doctrines which we will encounter again and again in this study. One of those doctrines is utilitarian - aimed at promoting and protecting the interests of the strong. "Prizes" are unequally distributed for two reasons: first, inequality of reward provides incentive for hard work, and second, losers have a rational basis for accepting less. The crucial factor has to do with impartiality of rules. The race must be fair. Arthur Okun (1975) and Diane Ravitch (1978) constitute archetypic advocates of this version of equal opportunity. As we will argue later, such a perspective (one we will label "careers open to talent") leads to quite different policies than an alternative view of equal opportunity, discussed immediately below ("equal prospects").

The second doctrine holds that everyone should enjoy equal prospects of success. The utilitarian doctrine would lead to players of unequal talent having predictably and automatically unequal prospects. The equal prospects doctrine would be more akin to "handicapping" in golf or racing. This concept of equality enjoys none of the utilitarian benefits of the first. It provides no incentive structure; it does not promise equal results but it does offer an a priori equality among individuals (these are points we will elaborate further in Section 2.2).

In summary, the difference in this context between "equity" and "equality" is that standards of equity determine how much emancipatory inequality can be tolerated as being "fair," and, how much simple inequality is necessary to maintain fairness. Note, that, if predicated of degrees and monies as these are distributed by the educational system, equity may dictate large simple inequality, i.e., inequalities in monies biased towards those more prone to school failure in order to produce a "fair" distribution of educational attainment.

The point of the above explication of the goals inherent in liberal education reforms aimed at expanding "equality of educational opportunity" and of the intents (not achievements) of concrete policies which embody those aims, has been to translate the abstract notion of the "good"--what is a just distribution of schooling resources--into the more concrete notion of the benefit: who now gains or loses from current distributions of resources and current efforts to re-distribute those resources.

2.2 THE BENEFIT: WHO GAINS FROM EXISTING EFFORTS TO IMPROVE EDUCATION

By "existing efforts," we mean those kinds of policies cited immediately above, i.e., examples of Policies Nos. 1, 2, 3, and 4. At issue is whether the distribution of benefits effected by those policies furthers the "good" of educational equality as defined, operationally, by the four goals of equality (i.e., marginal, global, simple and emancipatory equality) as identified above.

We assert now (but we will show in Sections 3, 4 and 6, below) that the successful implementation of policies to reach any of the four goals of equality necessarily implies one of the following: a pedagogy that would help the disadvantaged but have no particular benefit for the advantaged; or a disproportionate allocation of resources to the disadvantaged while preventing families of the advantaged from providing supplements outside the school; or a disproportionate allocation of learning time to the disadvantaged while advantaged children remain idle (spending no time in organized or informal learning activities). None of these probably constitutes a feasible practice or policy in American education today.

The practice of allocating disproportionately greater amounts of learning resources or learning time to the disadvantaged has been tried, but has yet to be distinguished by its success. Promise has exceeded reality because educators cannot control the total learning

environment of each child and it is that part of the environment outside of the control of the school which accounts for most of the variance in achievement (cf. Coleman, 1966, 1970, 1976; Averch, et al., 1974; Guthrie, et al., 1971; Jencks, et al., 1972; Shea, 1976). That being the case, advantaged families supplement and reinforce whatever beneficial effects are derived from school, no matter how time and resources are allocated, and thus the achievement gap prevails, or even widens. Under the present arrangement of schooling, any effort at disproportionate allocation of resources within schools will very likely suffer this fate.

Under the present arrangements of schooling it is presumed some children master some things not only more rapidly but also in more complex ways than others, and it is presumed that schooling must take place during a relatively fixed period in one's life. It follows that the level of successful school completions at any given time must remain below 100%. It is a fact that there are some children who master number sets by age six. There are others who don't master number sets until age ten and there are some who never master number sets at all. It is presumed to be too difficult for them. (None of this, of course, implies that number sets are essential at any age.) But the key, according to some educators, for raising the optimum level of school success beyond its present level, is to "diagnose" what it is that causes a child to have difficulty in mastering number sets or some other prescribed competency. Once that is "diagnosed," a particular pedagogy is designed that will correct the child's deficiency. The essential idea is that there are few children (those whose intelligence is immeasurably low) who can't learn . . . only children whose "prescriptions" are not right.

But if such assumptions were relevant for the disadvantaged child, they undoubtedly would prove to be relevant for the advantaged child. If that were the case, then existing pedagogy leaves the disadvantaged child no better off relative to the advantaged. Indeed, the disadvantaged child

may be worse off. The effect is to raise the expectations for all children. For example, with the growing practice of providing organized learning activities for the pre-school child through Head Start, ETV, kindergarden, day care centers, and nursery school, first grade teachers have raised their expectations about the level of cognitive development the average child should exhibit in order to be "ready" for first grade. It follows, then, that the promoters of remedial pedagogical practices for the disadvantaged cannot make the claim that their prescriptions will lessen the relative distance between the advantaged and disadvantaged, if their prescriptions work equally well for all. What we may be forced to accept is that everyone is better off when the level of mastery is increased overall, even though the distance between the most advantaged and least advantaged remains unchanged. If the goal is not to close the achievement gap between social groups, nor subsequently the attainment gap, then such an improvement overall has a great deal of appeal.

It therefore follows that the basic reason for attempting to reduce still further school failure among the disadvantaged cannot be the expectation that it will make all members of distinguishable social groups appreciably more equal as students or as adults. Rather the hope is it would help to remove the "stigma" of failure, give the disadvantaged student a more equitable claim on educational resources, provide more interesting and perhaps more relevant subject matter for such students while in school, and enhance the potential for further personal development for such students. These are important enough reasons for reform.

A minimum social policy might be defined thusly: support supplementary programs which further render the liability of school failure indistinguishable among the target groups. Achievement of that minimum policy would not ensure equal attainment for all individuals which is clearly impossible and probably undesirable. Rather the goal would be to ensure that school failure be more nearly independent of membership in a particular social group, whether it is determined by sex,

race, ethnicity, or economic condition, and that a significant number of individuals in any group do not fall below some minimum level. But, this definition of minimum social policy lacks a standard. How much emancipatory inequality (in the distribution of degrees, attainment, achievement results) is fair? The answer is: only as much as reflects the distribution of talent in the upper and lower classes, undistorted by the handicaps of class. This criteria allows us to judge as well as describe the contest for educational resources. Since it takes more resources to identify and nurture talent among the disadvantaged, equity requires an unequal distribution of shares (money). Such a standard challenges liberal practice to live up to ideals.

2.3 THE PROCESS: CORRECTING INEQUITY

The "theory of educational equity" which has guided our discussion so far embodies a notion of the educational system as a polity. Like all polities the system is constituted by values, structures and processes for determining who gets what, and how. The "process" dimension of our equity paradigm focuses attention on the "how". The "how" or the "Process" is reciprocally related to the "Good": processes determining who gets what, i.e., who benefits, impinge upon achievement of the "good" when the good is understood as a desirable distribution of benefits; and processes of distribution are themselves constituted by notions of the good. Rules for how one allocates certain benefits are based on some prior notions of what is a proper and just distribution.

This connection between the "process" and the good is built into our constitution of a theory of educational equity. The "Process" dimension forces the question: "How does our system of politics and economics impinge upon efforts to affect social and educational change through schooling directed at the Good = Equity?" Consistent with the discussion in Section 2.2, immediately above, the Good is defined as: "ensuring that the liability of school failure be indistinguishable among target groups" and "ensuring that school failure be more nearly

independent of membership in a particular social group whether it is determined by sex, race, ethnicity, or economic condition, and that a significant number of individuals in any group do not fall below some minimal level."

At present, the increased liability to experience school failure is among the most distinguishing characteristics of the target groups, i.e., the disadvantaged as defined in this study. It must be understood that correcting that circumstance or at least attempting to further reduce it, requires that two conditions be met, at a minimum. First, there would have to be a shift within the educational polity (as discussed in Section 4, "The Process"), which now allocates more educational resources to those who least need it. The shift would have to be away from the current predominance of values of efficiency and toward values of equity (this point discussed further in Sections 4.4, 4.5 and 4.6).

There are, of course, several ways of defining those eligible for additional resources: children from economically disadvantaged backgrounds, children from racially or ethnically distinct groups, children who are achieving a low levels, and children with learning disabilities. Obviously, there is considerable overlap, but there is likely to be far greater acceptance of the latter two definitions as a justification for expenditures because rich as well as poor families may be in a position to benefit. But even with the validity of prima facie evidence (i.e., the children obviously need help), to pursue such a policy would mean significantly increased resources for a substantial proportion of the school population--in some cases, the majority. To mandate that the schools must automatically allocate resources to underachieving children so that they would be brought up to satisfactory levels of performance would create a financial crisis of enormous proportion in most school districts. To do so would require greatly exceeding the proportion of education dollars we now devote to the schools unless (a) dollars were transferred from programs for presently "successful" students and (b) definitions of "satisfactory

levels" were constrained by a priori designated levels of available resources and technology, i.e., teaching efficiency.

The second condition requires a pedagogy that reduces differences in school achievement which stem from deficiencies in the child's background. No such pedagogy, to our knowledge, exists, nor probably can exist under the present arrangements of schooling. As pointed out earlier, the effort to change the output side of the achievement equation, by adjusting school inputs, has been largely unsuccessful because factors not under the professionals' control explain most of the variance in outcome.

Thus, there is a connection between the distributive properties of the educational system, its pedagogical limitations, and the general values in this country regarding social subsidies. As long as the learning deficiency is defined as social in origin, particular groups stand to benefit more than others. Government appears willing to distribute educational resources according to need when the need is physical and carefully prescribed, but less willing when need is distinctly social in origin, especially when that distribution threatens to "punish" the advantaged.

At the moment the massive reform which would be required to lessen the injury of school bias seems removed further politically. What remains to be seen, then, is what impact, if any, incremental and piecemeal policies, currently under consideration, can make towards the reduction of class bias in schooling. The extent of that bias is discussed in Section 3, immediately below. Structurally determined distributive properties of the educational system qua system are documented and analyzed in Section 4 and simulated in the "Model of the Contest for Educational Resources" presented in Section 5. That model is constructed with the intent that in the future it can test the likely impact of policy initiatives towards greater equity.

3.0 THE BENEFIT

To what extent do we approach equality as a goal in the distribution of educational attainment and benefits? And, to what extent have we approached an actual reduction in the influence of family background in the schooling experience? These two separate but related questions constitute the focus of our analysis of the social distribution of educational benefits. That analysis comes in two parts: first, we present a summary, analysis, and a discussion of the social implications, of data on the existing social distribution of school failure and school success; secondly, we summarize and analyze data concerning the nexus of social background and educational attainment across generations in order to better identify the dynamics through which the educational system qua system distributes educational benefits across social groups.

3.1 SOCIAL DISTRIBUTION OF SCHOOL FAILURE AND SCHOOL SUCCESS

3.1.1 The Equity Issue: Individual Differences and Social Differences

By observation, we would argue that an educational system distributes its benefits un-equally when some receive twice the resources received by others. But, by definition, we would argue that the system distributes its benefits in-equitably when the result is a distribution of school resources and attainments less equal than the expected distribution of attributes thought to be decisive in school success. As defined earlier, in Section 2.2, above, these attributes--aptitude, interests, and aspirations--are predicated of individuals qua individuals not qua members of social groups. In short, an educational systems distribution of benefits may be said to be equitable if

differences in educational attainment only reflected differences in individuals' natural abilities.*

Strictly speaking, equality (or equity) cannot be predicated of structures, systems or institutions but only of distributions of units of value which are institutionally determined. That is why it is unquestionably true in this society that while natural abilities are unequally distributed, we never talk about the "injustice" of such a condition. We may feel that some are blessed with talent while others are not, and that is unfortunate, but it is not unfair. It is not "unjust" that most of the population is too short to play professional basketball. It is a matter of luck. Some are luckier or unluckier than others. Arthur Okun (1975) argues that natural abilities, in this society at least, "are generally accepted as relevant characteristics that are being tested in the race rather than as unfair headstarts and handicaps." On this, Douglas Rae (1979:39) states:

As Rousseau keenly observed two centuries ago, a main point of our ideas and customs is to locate and promote inequalities. The egalitarian state, as it attempts to neutralize the stratifying effects of nature and culture, finds itself confronted with substantial problems, because people both as we find them and as society shapes them are not equal.

The battle lines of educational equity, however, are drawn on another kind of question. Which attributes of the family thought to be decisive in determining the distribution of educational benefits are unfair? Is it unfair that families of equal size and annual income

*Please note that it is merely a formal criterion. In the first instance, the "natural abilities" thus reflected in levels of educational attainment are those selected by the educational system as decisive for success within that system as measured by entrance, promotion and graduation standards. Of necessity, these standards will reflect the majority culture and the requirements of the economy which is to absorb successful pupils. Second, educational equity thus defined does not lead to general social equity (i.e., equity in the distribution of benefits in education) until and unless level of educational attainment and achievement were to determine occupational status and income.

may choose to invest very different amounts of time and resources in the intellectual, cultural or artistic development of their children--even though these children may begin life with essentially equal natural abilities? Is it fair that some families can afford to spend more although others cannot? (The question may not be whether equality, but which equality is fair.)

3.1.2 Family Background and Schooling

In recent generations, for most Americans, both the quality of schooling and the number of years of schooling are strongly associated with parental income and education (Coleman, 1966; Spady, 1967; Coons, Clune and Sugarman, 1970; Sewell, 1971; Guthrie, et al., 1971; Flanagan, 1971; Jencks, et al., 1972; Mosteller and Moynihan, 1972; Karabel, 1972; Michelson, 1973; Okun, 1975; Lewin, 1976; Shea, 1976; Bowles and Gintis, 1976; Hauser and Featherman, 1976; Featherman, 1977; Peng, 1977; Jencks, et al., 1979).

Generally, level of attainment is positively correlated with SES. For instance, Bowles and Gintis (1976) report that a child from the 90th percentile SES (weighted sum of income, occupation and educational levels) may expect five years more schooling than a child from the 10th percentile SES. When IQ is held constant, the gap is little affected. A child from the 90th percentile will still expect 4.25 years more schooling. And, children of the most severely disadvantaged families still do not participate successfully in high school (note the recent school dropout data in New York City, New York Times, October 23, 1979). Dropouts have diminished overall in numbers but the problem has enormously worsened.

Class background is also a determinant factor in college attendance and completion. Bowles and Gintis (1976) report that offspring from families below \$3,000 and above \$15,000 are separated by a 2 1/2:1 advantage in college attendance favoring the more affluent. From Project TALENT data, they estimate that the top SES students are

twice as likely to attend college as bottom SES.* The College Entrance Examination Board (1973) reports that among high school graduates of equal ability, those from lower quarter income families averaged a quarter to a third below the percentage of college attendance found among upper quarter income families. U.S. Office of Education data for 1976 show that about 30% of the children from families whose income is under \$3,000 attend college, while about 75% of the children from families over \$18,000 attend (USOE, 1976). Even these figures may underestimate the degree of bias. Sewell (1971) shows that while high SES students have a 2 1/2 times better chance of attending college than low SES students, high SES students have a 6 to 1 advantage in graduation from college and a 9 to 1 advantage in attending graduate school. Spady (1967) shows that while the proportion of low SES sons graduating from college has remained unchanged for approximately 40 years, the proportion of high status sons has doubled. Spady's findings are consistent with the more recent work of Featherman and Hauser (1976, discussed below). That these differences are due to class-bias and not entirely to differences in natural abilities judged necessary for school success is suggested by Michelson's (1973) research which shows that low SES students' chances of college attendance rise to about .81 when test scores are in the top quarter compared to .96 for high SES chances, but the odds of attending when a child is in the lowest SES and lower test score quartile drop to .14, as compared to a child in the lowest test score but highest SES quartile whose odds are three times greater, .42.

It is also the case that school failure is much more strongly associated with socio-economic conditions than with biological or ethnic origin. Blacks, for instance, have higher attainment levels than Whites when test scores and family background are equalized (Jencks, et al., 1972), although they earn less. In 1977, college attendance for men and women, including full and part time, showed essentially

*Project TALENT data show the following: The top 20% of achieving students in high school had a 95% chance of attending college if in the highest income quartile, and a 50% chance if in the lowest income quartile. (Rivlin, 1971).

equal numbers (although women still do not choose higher paying professions, and even when they do have equal educational characteristics, women earn less). Jencks (1979), relying on the work of Andrew Greeley, estimates the effects of ethnicity, independent of socio-economic background, to be a relatively minor factor. However, the work of Hauser and Featherman (1976) suggests that Spanish origin remains a significant, though diminishing factor.

3.1.3 Social Implications of the Social Distributions of School Failure and School Success

Data cited above show that inasmuch as family background appears to be the dominant causal variable in scholastic achievement and aspiration, and since achievement and aspiration are the dominant variables in school persistence (i.e., attainment-levels) the first inhabitants of higher levels of the schooling system and the first to benefit are very likely to come from the privileged class. In summarizing the effects of class, Jencks (1979:60) states:

Being white, having a father or mother with a lot of schooling, having a father with a high status occupation, having parents with high incomes, and coming from a small family all enhance a son's [but presumably less so a daughter's] economic prospects.

And, earlier studies (Jencks, et al., 1972) draw a connection between a child's socio-economic status, school attainment, and the distribution of educational resources: a child whose parents were in the top fifth quintile of income received roughly twice the educational resources in dollar terms as a child whose parents were in the bottom fifth quintile. The favored children stayed in school longer and their schools spent more per pupil (the biggest difference occurring at the college level).

(a) Social Implications of School Failure

Such conditions of class-bias strike our attention mainly because they contradict American democratic, or rather liberal-meritocratic ideals. In fact, the schooling system does not operate for all

social groups as a vehicle for realizing the aim of "careers open to talent." The result is that the schooling system not only perpetuates a class-structure by sorting out individuals for different job statuses (and, hence, income levels) based on their abilities but also perpetuates a particular class-structure by, in effect, simply transmitting the benefits of family class background. The social distribution of school attainment, then, promotes the "caste-like" tendencies inherent in any class structure which allows inheritance of economic advantages. Liberal-meritocratic ideals are consistent with a class structure in which inequalities in status and income can be shown to be a function of achievement. The equity or "fairness" issue arises when such inequalities are due to ascription.

Educational attainment has become, in Thomas Green's (1969) words, a "peculiar form of ascription." The more schooling becomes universal, the fewer alternatives there are for those who drop out. Since occupational status is defined largely in terms of educational attainment, and life-time income is partially associated with family background and schooling, failure in school, especially if one happens to be poor, means failure to accomplish that most cherished of American ideals: a high status, well paying job.

The fact remains that failing in school is important enough, economically, when combined with family disadvantages, to be enormously concerned when an urban dropout rate of 45% is reported. Completion of graduate school versus dropping out after grade school does make some difference. Jencks, et al. (1972) estimate the difference in income is 2.7 times more lifetime income favoring the graduate school alumnus. Jencks, et al. (1979:188) report that four years of high school, net the effects of family background and test scores, produces a 15 to 25% advantage in income and four years of college a 30 to 40% advantage and conclude that: "The earnings advantage of college graduates derives largely from the fact that they enter higher status occupations than other men." Although these differences pale, in the face of reported income extremes in the United States of 1,000%

(Jencks, et al., 1972), they remain individually important. They mean the difference between owning a condominium and a new car versus renting a small apartment, working a second job, and owning an old car. The great middle class paper chase in America is made of such differences, and the most important element is an intangible: it is impossible to estimate the social importance of a high status job except by observing the effort Americans expend in striving for and holding onto such jobs.

In terms of economic advancement, failure in the elementary and secondary schools is now a more serious liability than ever before because failure is highly concentrated among the poor. And, there are high concentrations of the poor among Black, Hispanic and female-headed families. Therefore, failure is far less equitably distributed, and means loss of any opportunity for large numbers from these groups to advance to that point of the school system where relative economic advantages may be gained. Increasingly, the point at which economic advantages may be gained lies not in completion of high school per se but in completion followed by college attendance.* Therefore, offspring of the impoverished are forced out of the education system before they can reach the level where their investment pays off.

(b) Social Distribution of School Benefits. A Two Tier Society: Education and Income

The major beneficiaries of the expansion of schooling and of rising overall level of school attainment have been the middle classes. And, yet, that has left them, the middle classes, still

*Even college attendance and completion per se would not, immediately, translate into a more equitable (i.e., class independent) distribution of social benefits. The pay-off in terms of lifetime earnings suggests further that additional advantages accrue to offspring of upper quarter income families even when educational attainments are equalized--due in part to curriculum differences, selectivity of colleges attended and social connections (although such differences do not much affect occupational statuses).

unsuccessful in gaining social advantages relative to the affluent. At the same time, however, the most impoverished have been cut adrift from both groups.

Table 3A, below, shows changes since 1961 in the educational level among five income groups:

Table 3A
YEARS OF SCHOOLING COMPLETED, HEADS OF HOUSEHOLDS
BY INCOME

	Lowest 5th	2nd 5th	3rd 5th	4th 5th	Highest 5th	Top 5%
Lower Limit in 1974 Dollars	(x)	6,500	10,700	14,900	20,400	31,900
1961	8.5	9.6	11.7	12.2	12.7	14.4
1971	9.0	11.6	12.3	12.5	12.9	15.0
1973	9.4	12.1	12.4	12.6	13.0	15.3
1974	9.8	12.1	12.4	12.6	13.5	15.4

SOURCE: Current Population Reports, U.S. Department of Commerce, Table 17.

The group making the greatest gain is the lower-middle class (column labelled "2nd 5th" in the table). They have closed the educational gap between themselves and those above since 1961. The most severely disadvantaged now form the remainder of a two-tier society and, although the target of educational efforts since the Johnson administration, educationally they lag well behind the middle class and affluent.

Families and heads of households of this bottom group may be described as follows: They live predominantly in the south but their proportions in the northeast are increasing more rapidly than elsewhere; they are more likely than other groups to be Black or other minority; fewer males among heads of households and heads are more likely to be very young or very old (just over one-third are 65 or older); thus this group has the smallest percentage in prime earning

years; heads of household are much more likely to be unemployed or out of the workforce (dropping from 55.4% in 1954 to 38.8% in 1974 employed). One of the explanations for the persistently lower educational level of heads of households among the poor (lowest fifth income group) is the high percentages of elderly in the that group. Those 65 and over comprised 31.5% of the lowest fifth heads of households in 1974 as compared to 18.9% of the second fifth. That represented essentially no change for the lowest fifth (30.0% in 1954) but an increase for the second fifth (14.4% in 1954). Yet, the second fifth moved up from 9.6 years of schooling in 1961 to 12.1 in 1974. The exact effects of age would have to be examined separately. Since it is true that school completions have been rising with each generation, then the income group with the highest concentration of elderly would be expected to have a lower level, on the average, of years of school completed. How much lower remains to be determined. (For details see Current Population Reports, U.S. Department of Commerce, Table 17.)

The middle class, on the other hand, has experienced rising levels of attainment at the high school level and a homogenizing of intra-class difference in educational attainment. In short, the middle class, despite persistent gaps in extremes of income across the society generally, is becoming somewhat more alike educationally. Jencks, et al. (1972) report that hypothetical pairs of random adults born between 1895 - 1904 would show an average gap of 4.2 years of schooling compared to 3.2 years among adults born between 1940 - 1944. Bowles and Gintis (1976) estimate that the coefficient of variation in males' average years of schooling in 1940 was 4.3 but in 1969 had been reduced to 2.95 (interestingly enough, the standard deviation of income earned by males 1950 - 1970 shows no significant change).

The decreasing variability in education level among individuals particularly concentrated in the middle three-fifths of income appears to be a function of school participation rate below grade 12 outstripping the rate above grade 12. Higher education remains

considerably less accessible to the underprivileged than primary and secondary education, creating a ceiling which rises more slowly than the floor under it. The result is a relatively constant ratio of college graduates to eligible candidates (high school graduates) over much of this century (Byrnes and Folk, 1970). For example: the ratio of 12th grade completions to eighth grade graduates in 1900 was 1:4.25 but in 1970 the ratio had fallen to 1:1.25. However, the ratio of baccalaureate graduates to high school graduates remains relatively fixed, being 1:4.0 in 1900 and 1:3.39 in 1970 (see Byrnes & Folk, 1970).

Since the proportion of college bound high school students has increased progressively since World War II but the ratio of college graduates to high school graduates five years earlier has remained relatively fixed, there is an inevitable regulation of the flow of credential holders, forcing more out, as more enter, and when required, retaining more as fewer enter (Weaver, 1978). Given the connection, cited earlier, between college graduation and life-time income it is not surprising that the group making the largest gain educationally, the lower middle class, has not enhanced its relative share of income. But the poor, however, despite being left behind, have not suffered any relative decline in income. The absence of any positive effects of education should not be surprising given the analysis of Jencks, et al. (1972) and Bowles and Gintis (1976). The only surprising thing is that, despite lagging behind, the bottom group has suffered no relative loss of income. Educational attainment appears to be largely or entirely independent of economic equality. The effect is that membership in the middle class is increasing but in terms of only one social criterion; namely, level of educational attainment.

(c) Policy Implications

The class-determined incidence of school failure and the class-determined chances of entry and completion of college (the level of attainment which translates into the most social benefit) and,

simultaneously, rising levels of school attainment among the middle classes unaccompanied by any relative gains, vis-a-vis the most affluent, in income, suggest the following implications for policy.

First, the schooling system does not, to paraphrase Arthur Okun, simply "test natural abilities in the race" for social benefits. Instead, the system continues to penalize "handicaps" and reinforce "unfair headstands." Instead of being a vehicle for careers open to talent, the system operates in much of the same way as envisioned by Jefferson: mass education for control and uplifting, and elite education for leaders. As each level of the education system becomes accessible to the majority of the population, and no longer serves to distinguish laborer from leader, the privileged simply move up. The point where social distinctions can be reaffirmed is forced to the next highest level of schooling, thereby for a period excluding the lower social strata due to financial, educational and dispositional factors.

Second, the system is not only inequitable but also inefficient. The preference in higher education for advantaged children regardless of talent is, in Okun's view and ours, both inequitable and inefficient. The system of higher education now excludes millions whose abilities exceed those admitted. The effort to redress this condition by compensating those with less means prior to leaving the system below grade 12 carries the promise of improving both equity and efficiency. As suggested in Section 2, above, such compensation would require massive re-allocation of education resources in favor of the disadvantaged. But the political will and, as a result of the existing social distribution of educational attainments (particularly among the middle classes), the political constituency for such a re-allocation of resources is lacking.

As a result of what we earlier termed as the "two-tier society" growing out of rising levels of attainment within the middle classes and the relative decreases in differences in attainment within income groups among the middle classes, lower class families now fail

to have educational interests in common with any of the middle classes. A little over a decade ago the interests of the poor and those of the lower middle class were essentially alike. Both largely failed to succeed in their use of the primary-secondary schools. What would have helped one presumably would have helped the other. Now, however, the educational horizon of the lower middle class has shifted to the post-secondary level while the horizon of the poor remains at the primary and secondary level.

3.2 HISTORICAL PATTERNS IN THE SOCIAL DISTRIBUTION OF EDUCATIONAL ATTAINMENT

Undeniably, as the schooling system has expanded, attainment levels for all social groups have risen. But, based on contemporary data reviewed in Section 3.1, immediately above, there exist class-determined differences in representative individuals reaching various levels of attainment. And, as more children reach particular levels of educational attainment the social benefit (i.e., crudely, pay-off in life-time income) of those levels decreases: for example, as more people achieve high school diplomas the economic value of that diploma decreases. The general impression one has from these data, therefore, is a sort of rhythm: as the poor began to attend common schools, the upper classes increased their own proportion in the high schools. When the poor began to attend high schools in large numbers, the upper classes increased their own proportion at the college level. The system appears to work like an escalator. Everyone moves up but relative positions remain unchanged.

Prima facie evidence for the latter assertion can be found in data, admittedly sketchy, suggesting that about the same degree of inequality existed in high school attendance prior to the turn of the century as exists now in college attendance. The relative attainment gap has not been eliminated. In some sense, the gap has simply been shifted to a higher level of the education system. Selwyn Troen (1973)

found, for example, that in St. Louis in 1881: that attendance of 13 - 16 year olds in high school ranged from 31.2% for children of the unskilled to 80% for sons and daughters of professionals, managers, businessmen and craftsmen. Michael Katz's (1968) study of nineteenth century Beverly, Massachusetts, shows a similar division of high school support between working and professional-managerial classes. David Tyack (1974) reports that urban high schools in the 1880's simply did not intend to provide seats for everyone--not even those who wanted to attend. Only one-third would have found seats in Chicago in 1886. New York City refused admission to 9,189 pupils who wanted to attend in 1881. In Philadelphia an estimated 20,000 children were unable to attend schooling because of lack of space in the 1880's. Compulsory attendance laws were ignored. Stephen Michelson (1973), as noted above, and others (see Flanagan, 1971; Peng, 1977; Levin, 1976) report the probabilities of college entrance among males of high and low status families in the 1960's and 1970's. The figures used by Michelson are remarkably similar to those of Troen, showing the probability of college attendance to be about .32 for low status males and about .86 for high status males.

Our concern here is for more detailed and precise information about inter-generational differences and trends in the social distribution of educational attainment levels in the twentieth century.

3.2.1 Schooling and Social Background: Trends Analysis

One of the primary sources of longitudinal data which allows conclusions regarding social background and educational attainment in America across generations stems from work at the University of Wisconsin Institute for Research on Poverty. Several research reports, articles and books flow from the analysis of two surveys (1962 and 1973) of male occupational and educational background (Occupational Change in a Generation).*

*The reader is referred to the following major publications from this work: Blau and Duncan (1967); Duncan (1967); Hauser and Featherman (1974); Hauser and Featherman (1976); Featherman and Hauser (1978).

Two major journal articles are reviewed below. The first to appear, and the second reviewed here, was produced by Beverly Duncan (1967), in which the 1962 OCG Survey data are reported. Her conclusion regarding educational inequality in the first half of this century is straightforward: no perceptible change in the relationship between family background and education attainment. Hauser and Featherman (1976), using the 1973 OCG Survey, reach a somewhat different conclusion: the tendency in more recent generations of a decline in the effects of family background on attainment. A review of the two articles follows.

Hauser and Featherman (1976:99) write: "In populations, distributions of schooling are not only generated by normative institutional, or economic arrangements, but also by the changing distribution of population across social categories which vary in those arrangements." In effect, the authors observe that children's educational experience, amount of education attained and intensity of the experience in school, reflect an agglomeration of effects of prevailing social conditions at the time those children were growing up. They also argue that there have been changes in those social factors which produce educational inequality and as a result real changes in the incidence of educational measures of inequality have occurred; unfortunately, the authors argue other aspects of social stratification across generations; e.g., occupational mobility across generations, are less amenable to change, suggesting little change in the quest for global equality (Featherman and Hauser, 1978).

With regard to intergenerational school attainment, Hauser and Featherman (1976) cite three trends: First, mean years of schooling have increased regularly and substantially across cohorts born in the first half of the twentieth century, rising from 8.91 years for the cohort born 1897-1901 to 11.78 years for the cohort born 1937-1941 (1962 Survey) and to 12.81 years for the cohort born 1947-1961 (1973 Survey). Second, variability of schooling has declined across cohorts.

The variability of schooling for men born at the time of the Spanish-American War is about double that of men born during World War II. Third, inequality in the distribution of schooling due to social background has fallen from the earliest cohort to the latest.

There is ample evidence that the goal of simple equality is in process of being achieved. The difference in father-son years of schooling over the cohort group range from approximately two to four years, highest among men born shortly after World War I and since declining. The shifts between cohorts five years apart reflect about .4 year change, favoring the younger cohort, but the mean differences are also falling. Taking into account changes in social composition (father's educational attainment, father's occupation, number of siblings, broken family, farm background, Southern birth, Spanish origin (1973 only) and race), the average variability between five year cohorts is reduced by about 30%. Thus, these factors account for about one-third of the change. The authors offer two conclusions: first, secular increases in educational attainment between cohorts may be decelerating--length of schooling may be approaching an upper limit with regard to social expectations, or second, the shifts may be traceable to changes in social background rather than changing expectations regarding school attendance across social groups.

3.2.2 Effects of Family Background

There is less compelling evidence that the goal of emancipatory equality is being reached. While there is some important evidence from Hauser and Featherman showing social background factors to have slightly and irregularly declined over cohorts born during the first half of this century, several cautions are in order: First, the results for youngest cohorts (age 21 - 25 in 1973) are suspect because many have not finished schooling, and effects of background may be expected to increase as that cohort ages. Second, the data may be confounded by differentiated effects of education, occupation and

family make-up between racial and ethnic groups. For instance, although intergenerational changes in occupational status for Blacks has been slower than Whites to change, the gap in years of schooling between offspring cohorts has been faster to attenuate than for Whites. Third, the two factors which we believe are particularly important, parental education and occupational status, show the least change over time in their effects on child's educational attainment.

With regard to net decline of background effects, Hauser & Featherman interpret their findings as follows:

Even disregarding the youngest cohort, one sees some evidence that the influence of social background on educational attainment has declined in this century - certainly there is no evidence that it has increased. The proportions of variance in schooling explained by the eight background variables decline irregularly from about .35 to about .28. Further, the absolute deviations about the predicted values decline across cohorts.

Regarding the effects of background within racial and ethnic sub-populations, Hauser and Featherman state:

On the whole, social origins have become more favorable to high levels of schooling within minority populations as in the majority group. Yet large differences in social origin persist among these groups, and in some instances the social origins of majority and minority populations have diverged. The specific handicaps of minority status, of farm background, of Southern birth, and of broken families appear to have declined in their impact, but there remains a set of family socioeconomic conditions - father's education, father's occupation, and number of siblings - whose effect has been stable across time.

Hauser and Featherman raise a fundamental equity question:

We believe it would be desirable to reduce the effects of the specific social characteristics we have discussed, but how much of the remaining family influence represents real inequity, and what proportion represents socially desirable, or at least acceptable, forms of social differentiation?

Presumably, the remaining proportion, particularly that having to do with these factors which show the least change over time (i.e., father's education and occupation and number of siblings), would have to do with prerequisite abilities and "readiness" to learn, direct effects on

student aspiration of background, and psychological hardships, including lost opportunities to seek alternatives to schooling (jobs, families, leisure). Hauser and Featherman imply the theme discussed later in Section 4. One is left to conclude that they (Hauser and Featherman) are wrestling with the issue raised by Okun, Ravitch and Duncan (see below) which asks how much government intervention to "correct" inequity is optimal with regard to social welfare. The trade-off may be equality for efficiency.

Hauser and Featherman (1976:118) raise a second quite important question, pertinent to this study: "When do further reductions in inequality in the schooling distributions become oppressive to those who supposedly benefit by spending more time in school?" The authors speculate, "Perhaps we have reached, or are approaching, an upper limit in inequality of the distribution school-years." Due to rising family background factors favorable to more, not less, schooling one might argue as Hauser and Featherman do, that pressure from that source may continue.

Beverly Duncan (1967) from her analysis of the 1962 OGC Survey data reaches a somewhat different conclusion than Hauser and Featherman regarding the decline in educational inequality due to social background. Duncan (1967:372) states:

The stability of family effects in the face of sweeping social change in this century cannot be ignored in forecasting the outcome of programs to equalize educational opportunity. As an illustration, no lessening in the effect of family background on schooling is observed for the cohorts that include recipients of the 'G.I. Bill.'

Duncan also suggests that equalization, if pursued too aggressively by government, may disrupt the benefits of family incentives, even if the total associated causal connection between family and attainment is relatively small. She warns, however, that the cost of not training youth in accordance with abilities (presumably meaning greater compensation for the poor) will produce future net

losses to society due to a suboptimally trained labor force. But, given finite resources, an "optimally trained" labor force might imply less compensation for the poor and more accelerated training for the privileged.

Whether programs to equalize educational opportunity should be undertaken is a separable issue. Because the advantage of one child always appears as the disadvantage of another, there is no single answer. To negate wholly the effect of family circumstances on son's attainment would eliminate generational transmission of social advantage as an incentive for parental prudence. From a societal perspective another issue becomes salient: the current cost of training youth as intensively as their abilities permit must be weighted against the loss in societal income some years hence which would result from a suboptimally trained manpower pool.

3.2.3 The Attainment Gap

From data reported in these articles, we have prepared tables which estimate the gap in educational attainment of male offspring associated with "high" and "low" educational attainment of parent (head of household).^{*} Due to differences in the way Hauser and Featherman (1976) and Duncan (1967) reported data, there is a difference in the estimate of the size of the gap in offspring attainment. Duncan (1967) reports proportion of variance explained by parent education, before other background effects are considered, but does not report proportion of variance of parent education, net the effects of other factors. Hauser and Featherman (1976) report effects, net other background factors. In addition, Duncan separates Whites and non-Whites, while Hauser and Featherman (1976) first report the total sample effects and later regroup data by race and ethnic origin but for different years.

Nonetheless, taking into account these differences in the reported data, while the size of the estimated gap differs, the pattern

^{*}"High" parental education attainment is calculated as one standard deviation above the mean of all parents and "low parental education attainment is calculated as one standard deviation below the mean of all parents.

of change and stability in the gap across generations is virtually identical from the two data sources. This is true even though the comparisons represent slight differences in cohorts (e.g., Duncan's time period 1921-25 must be compared with Hauser and Featherman's time period of 1923-27).

Table 3B

MEAN YEARS OF SCHOOLING OF MALE OFFSPRING
WHEN FAMILY HEAD'S EDUCATION IS HIGH OR LOW*

(1)	(2)		(3)		(4)	(5)	(6)	(7)	(8)
Year Offspring Age 16	V		E		R ²	R	E'	E''	E'-E''
	$\bar{X}$	SD	$\bar{X}$	SD					
1946-1950	8.7	3.6	12.0	3.3	.160	.400	13.317	10.682	2.63
1941-1945	8.3	3.7	11.8	3.2	.153	.391	13.051	10.549	2.502
1936-1940	8.0	3.9	11.4	3.4	.175	.418	12.748	10.052	2.696
1931-1935	7.8	3.8	11.1	3.3	.155	.393	12.396	9.804	2.592
1926-1930	7.5	3.9	10.6	3.4	.151	.388	11.919	9.281	2.638
1921-1925	7.4	3.8	10.1	3.6	.180	.424	11.636	8.574	3.052
1916-1920	7.4	3.8	9.4	3.8	.175	.418	10.988	7.812	3.176

SOURCE: B. Duncan (1967).

NOTES: V = Head's Education (mean and standard deviation for total).

E = Offspring's Education (mean and standard deviation for total).

E' = Offspring's Education When Head + SD.

E'' = Offspring's Education When Head - SD.

*Data re-computed from Table 5, B. Duncan (1967), using a raw data formula to compute years of schooling of offspring when head's education is one SD above and one SD below mean (1962 OCG).

Table 3C

MEAN YEARS OF SCHOOLING OF MALE OFFSPRING
WHEN FAMILY HEAD'S EDUCATION IS HIGH OR LOW*

Year Offspring Age 16	(1)		(2)		(3)	(4)		(5)	(6)
	V $\bar{X}$	SD	E $\bar{X}$	SD		E'	E''	E'-E''	E'-E''
1968-1967	10.68	3.78	12.81	2.38	.161	13.41	12.21	1.20	
1958-1962	9.89	3.88	12.76	2.76	.203	13.54	11.98	1.66	
1953-1957	9.18	3.96	12.40	3.01	.189	13.15	11.61	1.64	
1948-1952	8.46	3.92	12.02	3.31	.207	12.83	11.15	1.68	
1943-1947	8.00	3.90	11.72	3.39	.207	12.52	10.92	1.60	
1938-1942	7.69	3.99	11.46	3.38	.225	12.35	10.57	1.78	
1933-1937	7.35	3.95	11.03	3.42	.222	11.90	10.16	1.74	
1928-1932	7.11	3.94	10.55	3.50	.210	11.34	9.73	1.61	
1923-1927	6.90	3.95	9.87	3.74	.274	10.95	8.07	2.88	

SOURCE: Hauser and Featherman, 1976 (1973 OCG).

NOTES: ¹Years of schooling of offspring associated with one year of schooling of head of household (Table 7).

V = Head's education (mean and SD for total (Table 5)).

E = Offspring's education (mean and SD for total (Table 1)).

E' = Offspring's education when Head + SD above mean.

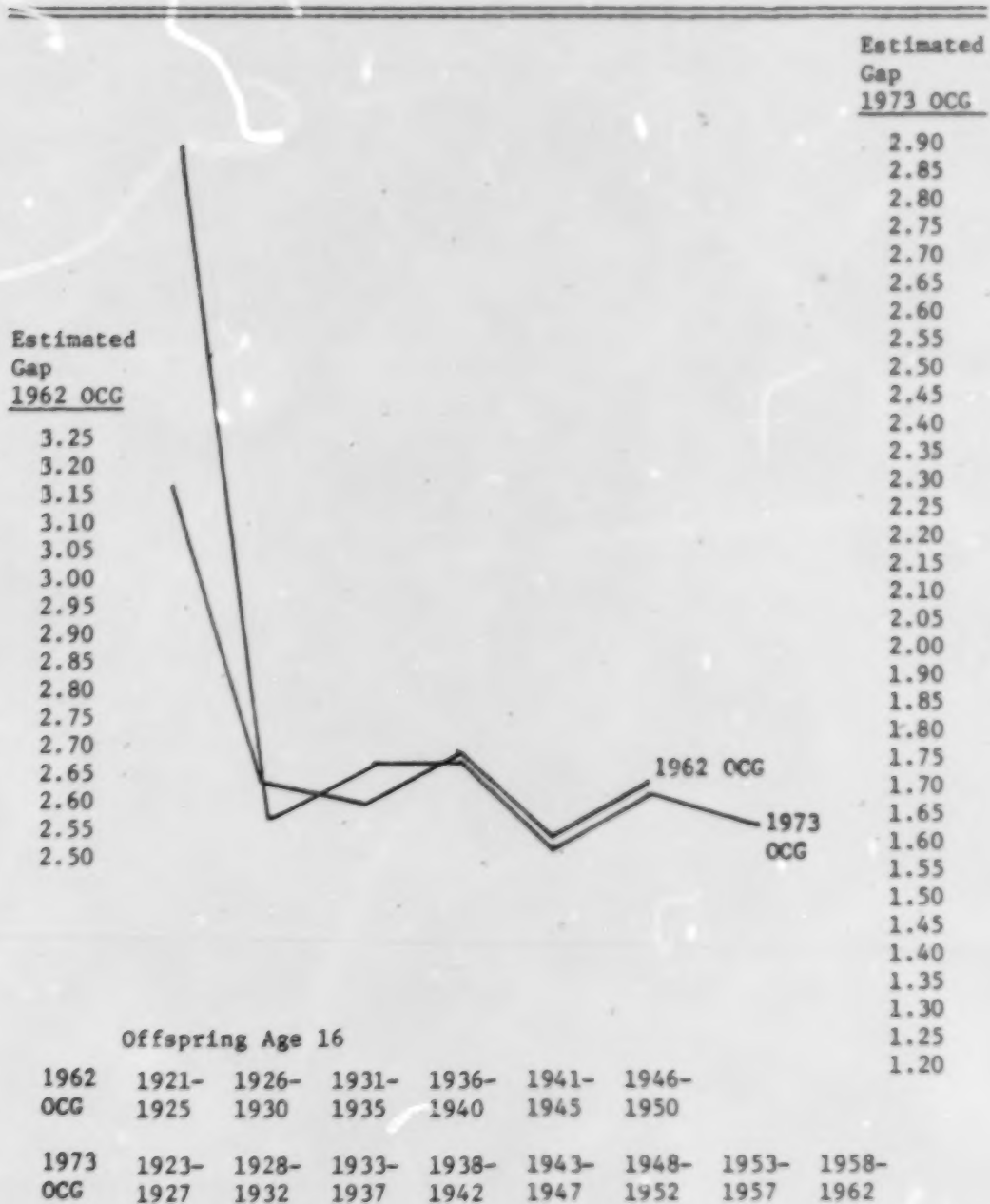
E'' = Offspring's education when Head - SD below mean.

*Data for E', column (4) computed by multiplying SD in column (1) by regression effect in column (3), and then adding product to mean of offspring in column (2);

Data for E'', column (5) computed as above and then subtracting product from mean of offspring.

Figure 3A

ESTIMATED GAP IN EDUCATIONAL ATTAINMENT GIVEN HIGH AND LOW
PARENTAL EDUCATION ATTAINMENT



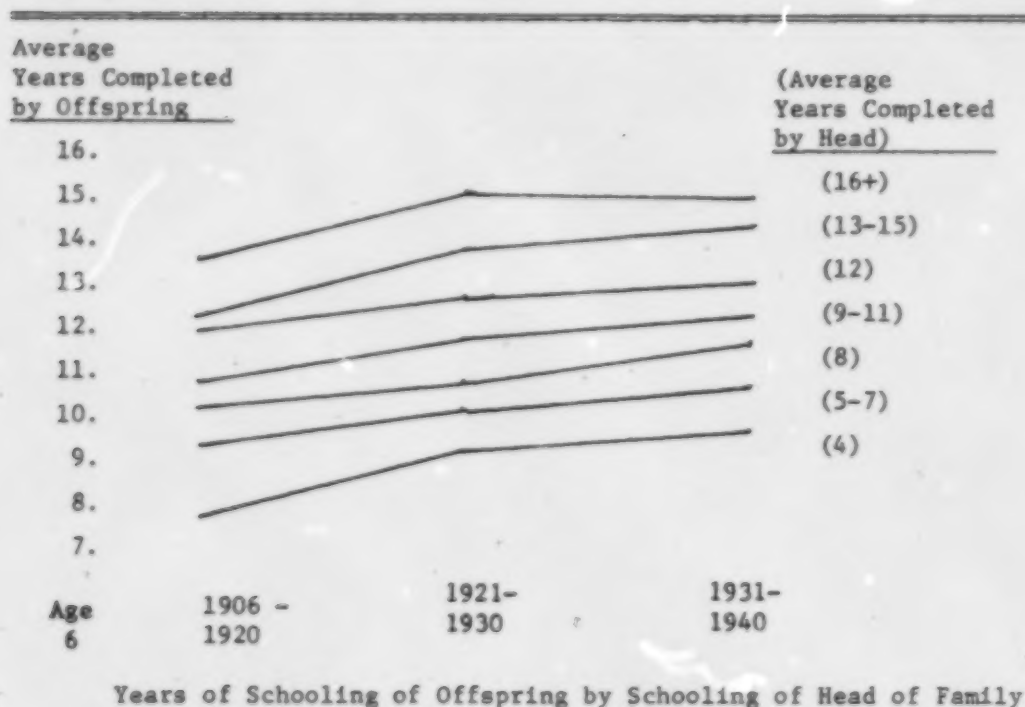
Duncan, 1967 (1962 OCG).

Hauser and Featherman (1976 OCG).

Figure 3B shows the education attainment of sons (1962 OCG) given constant differences in parent education for three intergenerational cohort groups. Quite consistent with our earlier analysis, the attainment gap at the extremes remains stable while groups in between shift up and down.

Figure 3B

ESTIMATED GAP IN ATTAINMENT FOR THREE
INTERGENERATIONAL COHORT GROUPS



SOURCE: B. Duncan (Indicators of Social Change, Table 24, p. 650).

3.2.4 School Resource Gap

From Duncan (1968) we have also estimated the school "resource gap" between offspring of high and low parental education backgrounds. Using a weighted index (see Table 3D below), the resource gap for cohorts age six after 1916 remains relatively stable. The ratio of school resources is higher than the ratio of years of schooling received because the cost per unit year of schooling rises with each sector of the schooling system causing costs to be proportionately higher for those with higher years of schooling completed, but the same pattern of stability across cohorts born during the first half of this century is evident.

Table 3D

ESTIMATED EDUCATIONAL RESOURCE AND ATTAINMENT GAPS

	Offspring, Years of Schooling				Weighted Index of Costs Per Unit of Schooling ³			
	High SES ¹	Low SES ²	Attain- ment Gap	Ratio	High SES	Low SES	Re- source Gap	Ratio
1906-10	10.98	7.81	3.17	1.40 :	38.94	23.43	15.51	1.66
1911-15	11.62	8.57	3.05	1.35 :	42.73	26.87	16.86	1.57
1916-20	11.91	9.28	2.63	1.28 :	43.59	30.40	13.19	1.43
1921-25	12.39	9.80	2.59	1.26 :	47.17	33.02	14.15	1.42
1926-30	12.74	10.05	2.69	1.26 :	49.98	34.26	15.72	1.45
1931-35	13.05	10.54	2.49	1.23 :	52.40	36.74	15.66	1.42
1936-40	13.31	10.68	2.63	1.24 :	54.53	37.41	17.12	1.46

NOTES: ¹ education of offspring given Head 1 SD above mean.

² education of offspring given Head 1 SD below mean.

³ Weights from Duncan (1968), page 620.

3.3 SECULAR SOCIAL AND SCHOOL FACTORS PRODUCING GROWTH IN ATTAINMENT

With regard to effects of family background, Mare (1977) asks the following questions: Do SES and other family factors explain rising levels of school completion at Grades 8, 9, 12, 13 and 16 (those factors being family income and parent education, number of siblings, broken homes, region of birth)? To what extent would observed trends have occurred even had cohort background composition remained constant? (This question is somewhat confusing because if completion rises, i.e., completions increase at grades 8, 9, 12, 13 and 16, then it follows, a fortiori, that one of the background factors, education of parents, must also rise in subsequent generations.)

Mare (1977) used the 1973 OCG data base referred to above (White males only). It is important to emphasize that 90% of the change in mean grades completed by five year cohorts groups born at beginning and mid-century is due to progression rates for the grades below college level. Linear relationships between rising parental background and rising schooling attainment are not invariate over the entire schooling process. Parent background factors have been rising at an approximate rate in correspondence with eighth grade completions, but not high school and college. Therefore, Mare's (1977) findings confirm the obvious: college is not expanding at the same rate, historically, that have grades K-12, and, thus, the coefficients above grade 12 between trends in SES and grade transitions are small. Rising parental background explains less growth at even grade 12 than grades below simply because school completion has been slower for grades 9-12 than K-8, and slower yet at the college level.

Five levels of school transition and seven background factors are analyzed by Mare (1977). These are listed below.

Transitions:

1. completes 8th grade;
2. completes 9th grade, given 8th grade completion;
3. completes 12th grade, given 9th grade completion;
4. attends 13th grade, given 12th grade completion;
5. completes 16th grade, given attends 13th grade.

Background Factors:

1. father's education;
2. mother's education;
3. father's occupation at respondent age 16;
4. family income at respondent age 16;
5. number of siblings;
6. born in South;
7. living with both parents to age 16.

3.3.1 Social Factors: Family Background

Mare's (1977) findings show that as the secular rise in father's and mother's education level equals one year, the odds of making the transition at each grade level (given that the grade preceding is completed) are increased by the percentages shown below, but the effects are greater at lower levels than higher levels of schooling.

<u>Grade Transition</u>	<u>Percentage increase in transition odds given one year increase in father's education</u>
	<u>Cohorts 1906 - 19 .</u>
8	.1180
8-9	.0855
9-12	.0759
12-13	.0406
13-16	.0181
16-17	-.0048

Growth in parental education has a decreasing effect on growth in grade transitions at higher grade levels. This analysis, in some respects, may be misleading. First, it eliminates the overall effects of SES trends on attainment trends occurring prior to a given transition level of schooling and then examines the effects of background given that the grade immediately below is already completed. Second, the linear relationship of SES and attainment level within cohort is well established (see Section 3.1.2): The within cohort effects of background on attending college are much greater than attending grade school, or high school, and are increasing (Jencks, 1979). Among recent cohorts, virtually everyone attends school up to grade 11, so effects are necessarily small.

Mare (1978) asks the following questions: Net the effects of secular trends in family background, what are the relative effects of economic incentives and school input factors on progression rates in schooling? (Bear in mind that between one-third and one-half of the highest grade attained in schooling is due to the secular increase in family background--nearly all accounted for prior to the 13th year.) Is the dominant remaining source of variance due to economic, particularly labor market incentives, or school quality measures?

3.3.2 Economic Factors

Mare (1978) used the following economic factors:

- (i) median earnings assigned each respondent based on an occupational average for 1970 earnings (U.S. Census);
- (ii) lag time for previous cohort experience to influence decisions of current cohort;
- (iii) lag time estimated empirically from observed influences.

Mare used aggregate capacity of family to pay for schooling, as represented by unemployment rate, recognizing the following cross pressures: (a) when unemployment is high, families are less able to sustain offspring in school, thus progression rate falls; (b) but, when unemployment is high, there is less incentive to leave school to enter jobs, thus progression rate rises.*

3.3.3 School Input Factors

Mare (1978) assumed the following:

- (1) Improved faculty salaries equate with improved instruction which causes more students to continue in school.
- (11) Reduced pupil-teacher ratios increase intensity of teaching and thus cause more students to continue in school.
- (111) Increases in average days attended implies increased achievement and thus higher attainments and service as such as a measure of seasonal disruption of farm/factory work, and is thus an index of weakening competitive work opportunities.

*In the CER model, we estimate unemployment and time to absorb terminators into jobs by schooling sector (see Section 5). Therefore, unemployment and time to absorb may be high for elementary terminators but low for college graduates; we believe that the above stated contradiction would be particularly pertinent to transitions from high school to college, viz., if college graduates experience high rates of unemployment and extended time to be absorbed into jobs, then both the incentive to continue beyond high school and the willingness of parents to subsidize lost wage opportunity are probably both diminished.

- (iv) Reductions in one-room schools means age grading, a more diversified curriculum and thus causes more attainment.
- (v) Increases in four-year colleges enlarges capacity of the system to produce attainments and is thus causal.

In some respects, however, Mare's model is mis-specified. First, the evidence is weak on relationships between combined school inputs and learning results, net parental background (see Section 2.2, p. 29). Second, the evidence on consolidation would suggest, if anything, consolidation has produced disincentives to reassigned students to continue in school, quite the opposite of Mare's assumption (Cf. Sher, 1978). Third, it is true, however, that in a general sense, "capacity" is a factor in completions, but if capacity exceeds the number of entrants minus those graduating or terminating, there is an institutional incentive to attract more students; and, conversely, if students exceed capacity, there is an institutional incentive to reduce the numbers of students entering (see Section 5). Fourth, with regard to salaries and pupil-teachers ratios, we believe that these are by-products of schooling growth; in effect, second order causes of growth, not the primary causes. Consequently, for these reasons, we have chosen, as the reader will see later, not to endogenize such factors as salaries, class size or consolidation in our system dynamics model as the primary explanations of differential success rates of high and low social class offspring. We have, however, chosen to endogenize effects of employment and unemployment, parent background, achievement and expenditures as these differentiate termination rates of the two social classes. We argue that without resources (meaning monies and the educational "goods" monies can buy (e.g., staff, facilities and programs designed to keep disadvantaged students in school) the disadvantaged would terminate at a faster rate--regardless of achievement, and, a fortiori, when more monies are provided for such "goods" the disadvantaged terminate at a

slower rate. On the other hand, we argue that public resources are less determinant for the privileged who can compensate for losses of such funds by substituting private means.

Mare's (1978) findings show that labor market factors influence progression rates at each point of transition, and that salaries, expenditures per pupil and average days attended influence progression. However, we believe that Mare (1978) is only partly correct when he states, "growth in the resource levels and the intensity of schooling have determined educational growth (p. 57)." We believe "intensity of schooling" and "resource level" are second order causes and arise only after demand pressures in the system, and it is the demand pressures which are the primary determinants of growth (see Section 4.3.2). Mare (1978) also found that school inputs, relative to labor market factors, decline as the level of grade transition rises, a finding we would expect, given that incentives to leave school rise with age and experiences of the student and wages that could otherwise be earned.

3.4 SUMMARY

Section 3 focused primarily on the results of the contest, results exemplified primarily in levels of school attainment. Briefly, and somewhat oversimplified, the message is this: (a) the system exhibits differences in attainment; (b) a null hypothesis is that these differences merely reflect differences in natural ability; but (c) data show systematic class differences in attainment thus suggesting that class-background (and not natural ability, alone) confers handicaps and unfair headstarts in the educational race. This is the message of the first part of Section 3. The second part of Section 3 (the review of Duncan's, Hauser and Featherman's and Mare's OCG research) (a) explores intergenerational differences in the class distribution of attainment; (b) explores more precisely the effects of trends in family class-background relative to economic and school-input trends, and (c) thus,

provides a prima facie case for considering economic conditions and school resource allocations as having something to do with explaining different attainment levels among different social groups. In the next Section, 4.0, "The Process," the focus is on resource allocations--what the contest is all about.

4.0 THE PROCESS

The "Process," as defined in Section 2, above, refers to the dynamics through which an institution system, in this case the educational system, distributes "goods." Our focus here is on how that system dynamically produces its own inequalities despite historically increased access to that system and despite repeated efforts to equalize access to educational benefits.

4.1 GROWTH AND INCREASED ACCESS

As noted in Section 1, "Introduction," several historians have observed that the education system has benefited both the privileged and underprivileged, but first the most economically advantaged and only after that the least advantaged. That history, as reported by Katz (1970), Tyack (1974) and others, suggests that after each period of American history in which the importance of compensatory education has been debated and reforms proposed, there has followed, immediately, a period in which the explanation for the system's failure has placed blame on the child, his parents or his genes. The account of why schooling fails to serve minorities has simply shifted over a century of time from "depraved" to "deprived." During each of these periods, efforts to significantly alter the curricular and schooling arrangements were initiated in order to provide opportunities for the underprivileged. Primarily, reform stressed the need for correcting imbalances in school success by pedagogical practices and resource allocations compensating for environmental factors. Each period of reform has been followed by frustration of reformist expectations and waning of reformist zeal. These failures have been "explained away" by a re-emergence of emphasis on heredity as causing school failure (Katz, 1970).

Significantly, we find that those periods have tended to follow cycles in which the "locus of selectivity" (level of the schooling system

where a majority terminate formal school attendance) reached some temporary barrier - for example, saturation and build up of pressure between the eighth and ninth grade. Pressure to penetrate these barriers is assumed to arise initially among the privileged because when the majority begin to succeed in completing school, the relative advantage of the privileged is eroded. There have been three such periods. First, there was a build up of pressure on seventh and eighth grades, finally giving way to growth at those levels (1850-1880). Dramatic increases occurred from less than a majority enrolled in primary schools to a majority. For example, in Massachusetts from 1840-1865 alone, there was a 53.8 percent increase in elementary enrollments.* David Tyack (1974) reports enormous upward pressure on unprepared urban school systems in the decades immediately following. For instance, only one-third of the eligible school age population would have found seats in Chicago in 1886.

The second period (1900-1940) was one of pressure to expand secondary schools, giving way to growth and significant change in sources of revenue (from local government to state government). From 1910 to 1930 the percentage of adults completing ninth grade rose from less than 20 percent to more than 35 percent. Pressure would begin to build on the next natural barrier, high school completion. The third period (1950-1980) is of particular significance. The barrier to be penetrated is the first year of college. The drift upward, covering the first three-quarters of this century, has now reached the point of discontinuity between that part of the system which historically has been viewed as universal and that part always viewed as selective. By 1970 high school completions had reached almost 75 percent, putting great pressure on the postsecondary system. Completion of the first year of college had been driven up nearly 100 percent by that pressure (from 25% completion to 45%) in one decade. The decade 1960 to 1970 was the flowering of the community colleges which absorbed much of the pressure.

Given finite resources, the inevitable resolution of this long term dynamic is a series of trade-offs in the classical policy sense. In the

*Due both to demography and proportion of cohort attending school.

present period, for example, continuing efforts to: eliminate high school failure; allocate sufficient resources to racial integration, bi-lingual education and education of the economically disadvantaged; open access for women at all levels of the education system; and ensure least restrictive treatment of the handicapped in all schools (not just the leadership suburban areas), all represent agendas which would claim resources otherwise demanded for further education of the advantaged. The successful allocation of resources to the disadvantaged and minorities would have a two-fold effect: (a) fewer resources for the advantaged; and (b) a threat to favored treatment and relative social advantages provided by schooling (or perceived to be provided by schooling). These perceived advantages of higher levels of educational attainment only recycle demand for still more resources for higher levels of the schooling system.

4.2 GROWTH, INCREASED ACCESS AND EQUALITY

In the historical drive toward global equality and in the system's dynamic response to that drive, the nineteenth century privilege of a common school education has begun to mean the "right" to expect equal learning benefits on the part of social groups. Perhaps put another way, that putative right holds that failure in school should not be a stigma which characterizes any particular social group, regardless of differences present prior to their schooling experience. The failure to fulfill that expectation calls forth efforts to reform education.

One can also find this evolving quest for global equality in other social institutions--freedom from pestilence and infectious disease has become the "right" to expect equal medical care and benefits. Charity for the poor has become a "system" of welfare with "rights" and expectations regarding benefits and equal life chances, and, now, entitlement to property (note the Boston Housing Court Judge who recently stated that public housing should be turned over to the tenants in order to save the property). Recall Tocqueville's summation of American society: "What the few have today, the many will demand tomorrow."

What Tocqueville neglected to observe is that as the many advance, the few also advance. Blau and Duncan (1967) conclude that the United States among industrial nations fares well as to degree of openness and upward mobility. Yet, the mobility ratio of those born of middle class families is about double the ratio of those born of manual and working class families. Hence, intergenerational mobility in America shows the same, "frozen" pattern found in gap differentiated levels of educational attainment. While opportunity exists for the lower classes to advance, opportunity also abounds for the upper classes, and, while both groups move ahead, the gap between them remains constant. Blau and Duncan (1967:424) in analyzing the 1962 OCG trend data for four generational cohort groups in America, representing three-quarters of a century in time, conclude, "These data show that the influence of social origins on career beginnings has not changed at all in the last 40 years." Featherman and Houser (1978:216) in analyzing the 1962 and 1973 OCG Trend data conclude: "Both within and between generations, occupational mobility chances have remained remarkably constant over the historical periods covered by retrospections in the 1962 and 1973 OCG surveys." To use an earlier metaphor, it is as though the major social classes are riding up an occupational escalator, all advancing, with those in the middle taking a few steps up and a few down as the escalator moves, but on the whole the groups at the extremes remain intact, immobile and highly distinguishable as groups.

This notion of the moving escalator is central to our analysis of The Process. In a global sense, the entire system of social statuses shows upward (and downward) movement, but the fluidity is never great enough to alter the relative positions of upper and lower social classes. That we repeat this metaphor in describing the distribution of educational benefits is not merely coincidental. The formal schooling system does not just reflect this same distributive regularity; schooling is part of the overall system of status distribution and it too is so structured that more schooling opportunities are available for all, but the relative positions of upper and lower classes in terms of attainments and resources is

not altered over time. Having said that, however, is not to say alteration of the distribution of educational attainment would lead to alterations in the social class structure, until and unless educational attainment literally defines class status. As shown in Section 3.2, above, recent movements upward in the educational attainment of the lower-middle class have produced no change in the relative income rank of the lower-middle class.

Consequently, even rising general levels of educational attainment have not contributed to emancipatory global social equality. This fact has shaken liberals' faith in the efficacy of liberal reforms of schooling. Carnoy and Levin (1976), for example, state:

In our view the schools of a society serve to reproduce the economic, social, and political relations, and the only way that schools can change those relations is through their unforeseen consequences rather than through planned and deliberate change. In this sense we argue that a society based on largely unequal positions of power, income, and social status among adults will not be able to alter those relations through the schools. To the contrary, the schools will tend to reproduce the inequalities in order to contribute to the legitimation of adult society.

4.3 GROWTH, INCREASED ACCESS AND THE DYNAMICS OF INEQUALITY

How does the schooling system do what Carnoy and Levin argue, i.e., "reproduce the inequalities in order to contribute to the legitimation of adult society?" A complete response to this question demands not only an understanding of the dynamic behavior of the educational system but a dynamic theory of society. The latter is naturally beyond the scope of this work. In the sections which follow we will offer a set of assumptions which reflect our understanding of the dynamic behavior of the educational system's distribution of resources and attainments. Our concern is how the educational system dynamically produces its own inequalities.

4.3.1 Growth and Relative Advantage

At the core of the system's dynamic is the concept of "eroding relative advantage." As relative advantage (defined in terms of occupational

status, income, mobility) is perceived to be threatened, those who associate such advantages with schooling, and are able to use the system effectively, seek to maintain relative advantage by educationally advancing further. Social class marks those who are most and least able to perceive and use the system to their advantage. This fundamental premise stems from the work of Green and Haynes (1972) and is described by them as (1) "the law of zero correlation," (2) "the principle of shifting utility," (3) "the law of last entry," and (4) "the principle of the moving target." The significance of these principles is that as each distributive condition changes so does any construct of The Benefit change. First, "the law of zero correlation" identifies a point of schooling dividing the majority who terminate from those few who continue, as in the case of high school graduation prior to World War II. As most of the eligible cohort begin to complete such a level of schooling, any subsequent relative benefit previously derived from completion of that level predicated upon scarcity is lost. In short, the principle is tautological. When one of two variables ceases to vary, there will no longer be a correlation between them. It also implies that the point of termination, once associated with relative benefits, becomes a floor above which one must travel to create educational and associated differences in relative benefits bestowed on the basis of educational attainment. Second, "the principle of shifting utility" states that as the point of zero correlation is approached, "it will turn out that one of the chief benefits of schooling is more schooling (Green and Haynes, 1972)," simply because no particular benefits distributed on the basis of scarcity are so distributed at that level. Third, "the law of last entry" states that because of inherent advantages of the upper classes, (advantages embodied in parental expectation, "readiness," competitive peer pressure, psychological tolerance for more schooling, and the financial ability to defer lost opportunities to work), the lower social group follows the upper social group to higher ranks, saturating those ranks only when the upper group has already passed through to the next rank. And, fourth, as the lower group enters a higher rank, it

finds that benefits once conferred at that rank are no longer attainable for reasons having to do with "the law of zero correlation." The target has "shifted" to the next higher rank. The "principle of the moving target" states "that as the group of last entry attains its target, the target will shift (Green and Haynes, 1972)."

We would argue that there is a certain historical regularity in educational resource allocations which reflects the Green and Haynes thesis. That regularity may be described as follows: (1) As social groups become more alike educationally, due to expanding opportunity, "pressure"* arises to increase the differences; otherwise the relative advantages of schooling are long lost. (2) A "counterpressure"** constrains growth as more educated people saturate lower levels of the labor queue forcing lower wages and thereby reducing return on investments in education; the effect is to produce still further strains to restrict schooling at the upper levels and increase differences between social groups. (3) The pressure to widen differences between social groups conflicts with the pressure to fund compensatory programs to reduce such differences (the latter pressure coming from those who do advocate programs for the poor). (4) The "natural" or historical limits of resource allocation to education are strained producing the necessity of trade-offs. (5) The conflicts over resources follow a cycle: pressure for compensatory programs gains visibility, giving way to frustration with results, and a waning of effort. (6) The pressures for policies favoring members of the upper social strata ultimately dominate; the effect is an

*We would offer as examples of the "pressure" to increase differences, the spreading talk about increasing standards (Harvard's curriculum reform), competency testing of students and teachers, led not by advocates of the poor (excepting Jesse Jackson) but by conservative advocates of the educational establishment.

**The "counterpressure" comes from market changes in student decisions to attend college, most notably the decline in proportion of white males entering college as cited by Freeman (1976).

increase in funds allocated to higher education relative to those allocated to programs for the disadvantaged.

4.3.2 Growth, Relative Advantage and Educational Inflation

Our hypothesis suggests that the key effect of education at one level is to drive up demand for schooling at that next level at which completion confers skills and credentials which remain non-scarce goods. The effect can be seen in a series of accelerations in the rate of school attendance and completions, triggered in part by the onset of a form of "education inflation." These periods of acceleration we have labeled "Zoom."

Majority completion at one level appears to be the signal for expansion at the next, followed by a process in which the signal is translated into institutional action. We hypothesize that expansion occurs after influence is exerted through political institutions (as for example in the federal educational budget allocations) but such expansions may not be economically optimal. For example, higher education funding at the federal level accelerated during the 1970's while the college job market decelerated (Freeman, 1976), resulting in substantial "overspending" and an erosion in the economic value of college credentials (the system created during this period approximately one million surplus teachers alone; Weaver, 1978). When one-half to two-thirds of any given cohort begins to complete a significant point in the education system, acceleration in school completion rate starts at the next highest level of the system: such points have been the last year of elementary school, first year of high school, high school completion, first year of college and college completion. Figure 4A illustrates the pattern over the eighty year period, 1900-1980. It can be seen in Figure 4A that eighth grade completion rose from 50 to 65 percent during the period 1910 to 1930. Ninth grade completion during the 1910 to 1930 period increased at a steady rate of about 5 percent each decade but in 1930 suddenly began to accelerate, rising from 35 to 50 percent in one decade (1930 to 1940)-- a three-fold increase.

YEARS OF SCHOOL COMPLETED FOR POPULATION

Source: Byrnes & Folk (1969)

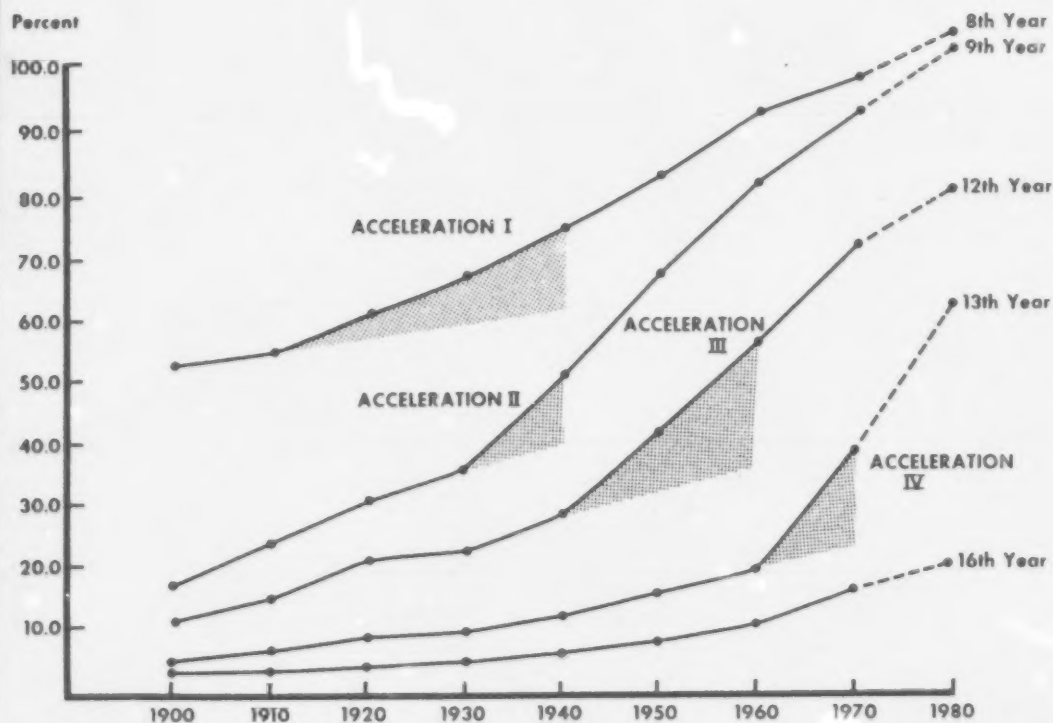


FIGURE 4A

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Twelfth grade completion, apparently unaffected by the accelerating eighth and ninth grades, increased at a steady rate of 5 percent each decade up to 1940, and then suddenly accelerated, rising from 27 to 40 percent in one decade, 1940 to 1950--nearly a three-fold increase in rate (keeping in mind World War II temporarily depressed the rate of high school completions but then stimulated it after the war). High school Zoom is followed two decades later by college Zoom. Completions of first year of college, increasing at a steady 3 percent per decade prior to 1960, suddenly accelerated, rising from about 20 to 40 percent in the period 1960 to 1970--a seven-fold increase in rate (note the delay in college Zoom as high school completions continue to grow from 1950 to 1960, rising from 40 to 55 percent). It is important to note that college Zoom is accompanied by rapid economic expansion, the Vietnam War, and a continuation of the transformation of the economy into service dominance. The fastest growing sector of the economy during the 1960's was the college supplied services sector (education itself expanded rapidly during that period).

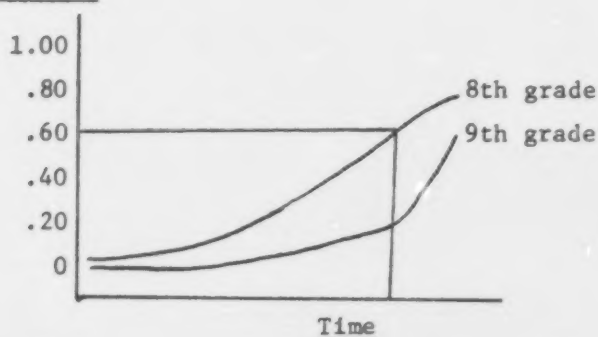
From these data, Zoom appears, over the long term, to have begun when a preceding cohort reaches a completion rate of between 50 and 60 percent, and while expanding economic conditions are associated with the first and third periods (they are not associated with the second period, i.e., the Depression years). The primary determinant for expansion appears to be the build-up of persons with prerequisite educational characteristics at the level below. The cause does not appear to be overall attainment level among adults but rather attainment among those cohorts just ahead of Zoom. Since cohorts separated by a generation do not for the most part compete directly for positions in the labor hierarchy (Freeman, 1976), it is therefore assumed that they ordinarily do not compete for educational skills and credentials. Take the case of a particular cohort, the 35 - 39 year-olds, who were entering the first year of elementary school during the period 1945-1950. The cohort immediately ahead of them shows a majority completing ninth grade for the first time

in the United States. But those persons 12 full years ahead of them were completing high school in relatively small numbers--35% in 1945. The cohort 12 years ahead, however, did complete ninth grade in larger numbers than its predecessor (about 50%), therefore deflating the value of that level of attainment and building up the numbers of persons with prerequisites to continue in school. By the time the first grade of 1945 reaches high school graduation in 1957 their completion rate has risen to 55%, or a majority. Ahead of them, the first year of college remains a barrier for most--only 20% of the first of this cohort will enter college. But the last of this group and the cohort immediately following will attend and complete one year of college at a rate two times greater (40% by 1970).

The acceleration in growth rates may be summarized as follows:

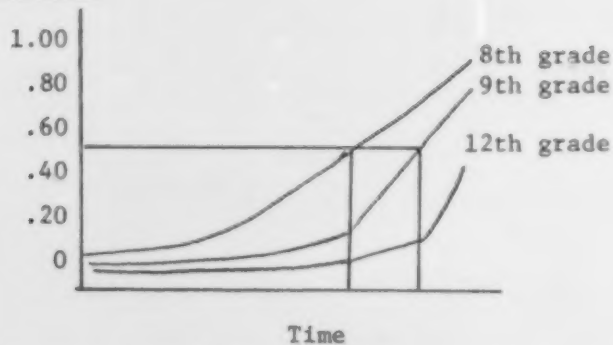
- a. An acceleration in ninth grade completion began at about the point when one-third of the eligible cohort completed that level (1930). The starting point of acceleration coincides with the rise of eighth grade completions to approximately 60 percent. Completion of ninth grade reaches a majority of the eligible cohort (14 year olds) one decade later (1940).

Completion Rate



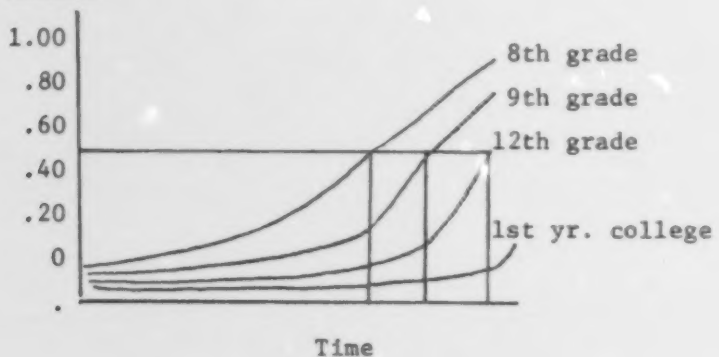
- b. Majority completion of that cohort at the ninth grade triggers an acceleration at the next level, high school graduation among the immediately preceding cohort. At the initial point of acceleration in 1940 about 27% of the eligible cohort complete high school; by 1960, the completion rate is 55%.

Completion Rate



- c. During the period 1940-1960, growth rate at high school graduation begins to exceed the growth rate at the eighth grade level which has begun to plateau (ninth grade continues to accelerate).
- d. When high school completion reaches 55% in 1960, completion rate at the next highest level, first year of college, begins to accelerate, rising from 20% of eligible cohort to 40% in one decade (1960-1970).

Completion Rate



4.3.3 Spin-Off Effects: Inequities

The three periods of Zoom result in substantially larger proportions of the cohort remaining in school for longer periods of time, thus driving down, at each level, the relative economic value

to schooling for credential holders. The manner of expansion does not affect various population groups evenly. Expanding the supply of once scarce skills and credentials has the effect of making such skills and credentials least valuable for the last to acquire them. The last to acquire them are the underprivileged.

4.3.4 Growth, Education Inflation and Finances

Costs rise as the system expands primarily because of smaller class sizes and more expensive capital and faculty investments (including overall increases in salaries). The per pupil costs in 1976, for instance, show that elementary expenditures were \$1,573 per child while secondary expenditures were \$2,198 (Digest, Tables 19 and 29, 1977-78).

During each of the three periods of Zoom, there have been very large shifts in the source of financial support for education.* Figure 4B shows that between 1929 and 1949, the local community ceased to be the predominant source of educational funds and the states began to play a major role in financing the schools. The local percentage of school revenue fell from 84 percent to 58 percent, while state revenue rose from 17 to 40 percent. The period, 1930-1950, is the period of acceleration in high school attendance (51% to 73%) and in high school completions (22% to 40%). The bulk of the state funds were used for consolidation, transportation and maintenance which enables high schools to expand and to attract outlying populations. The next period of Zoom, 1960 to 1970, the era of college expansion, is accompanied by a significant increase of federal funding as a share of total expenditures for schooling (rising from 4.5% to 8.0%).

*Douglas Rae (1979) argues that the drive toward equality in this society, as noted above on page 66, forces government action to be transferred to higher and higher levels of aggregation. For example, inter-district equalization can only be effected at the state level, but inter-state equalization can only be effected at the federal level.

SHIFT IN SOURCES OF EDUCATIONAL FUNDING FROM LOCAL TO CENTRAL GOVERNMENT

Source: Digest of Educational Statistics

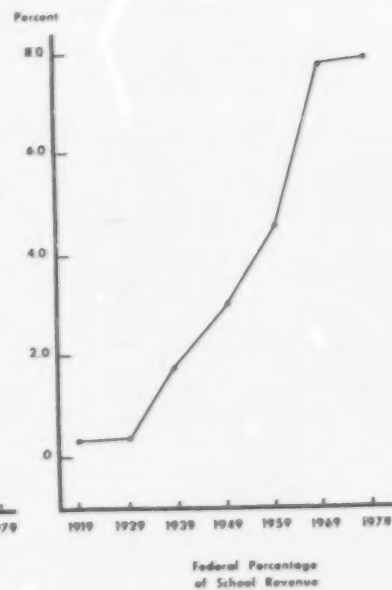
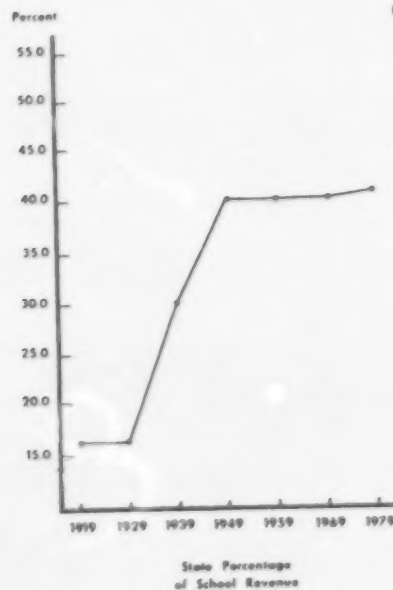
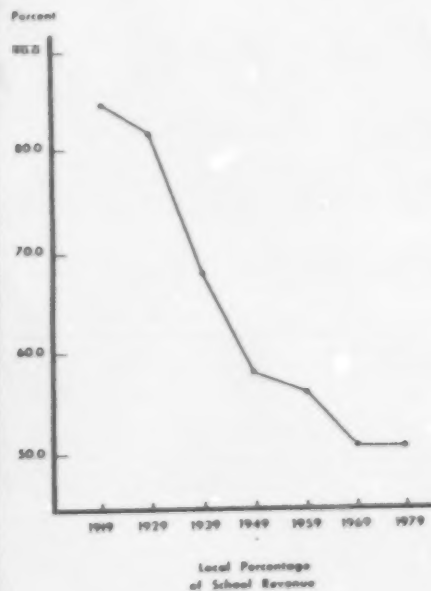


FIGURE 4B

In any case, the initial benefits conveyed by each period of Zoom are distinctly class biased. The first to benefit are offspring of upper SES families but, as Zoom continues, the advantages of class diminish (and, importantly, so too do the relative pay-offs of schooling). Levin's (1976) data show that the probability of college entrance in the United States in 1960 favored children of privileged families by a ratio of 8:1. By 1969 the ratio had fallen to 2:1. Bear in mind that in 1960 only 20% of the eligible cohort were completing first year of college. By 1970 the completion rate rises to 40%. It is essential to know also that in 1970 the sons of upper class parents had a 6:1 advantage in completing college and a 9:1 advantage in entering graduate school.

The key to Zoom may well be the recognition among privileged families of declining chances to enroll their children selectively at a level of the system which produces relatively scarce skills and credentials. That recognition is transformed into political influence and decisions of political institutions.

Initially, the allocation of resources at each level of the education system where skills and credentials have become relatively scarce will be primarily to the advantage for upper SES families (although not entirely so--regarding college entrance, the odds of the brightest sons of poor families entering college is about equal to the odds for sons of all abilities from affluent families). As Zoom continues, funds allocated to level completed by everyone become more equally distributed, but the result is a lower return on investment for all who attain that level and do not go on to higher levels.

From the data above, we would speculate that when entry of any selective level of education reaches approximately one-fifth of the eligible cohort, the overall advantage of the affluent will be about 8 to 1. When entry reaches 40 to 50 percent, the overall advantage will have declined to about 2:1. At that point, Zoom will begin at the next

highest level. When 50 to 60 percent of the eligible cohort enter any previously selective level, we can expect from these data that the entry advantage of upper SES families at the next terminal point will be approximately 6 to 1, and, in completing, the advantage will be about 9 to 1.

The rate of completions at the previously selective level will continue to accelerate until completions reach a level of saturation (about four-fifths of the cohort). Completions above that level will also begin to accelerate reaching saturation. However, it remains to be seen whether higher education will follow such a pattern. (There are a number of reasons to suspect it may not, the most important having to do with the economy's ability to absorb college graduates--see Freeman (1976).

The net result is (a) a decline in overall population variance (people become more alike educationally), (b) a reduction in relative advantage of credentials and skills, and (c) an increase in entrances at the next highest level, followed by a rapid increase in completions at that level. The reduction in relative economic value for possessors of skills and credentials affects in a different way different components of the population. Since rate of return is greater for Whites than non-Whites, for males than females, and upper strata than lower, the declining value of credentials and skills will more severely affect the poor and other minorities. They gain less by each unit of schooling. They acquire each unit only after everyone else, generally speaking, and therefore acquire educational credentials when those credentials are at their lowest premium. And, per unit costs of education rise as the system expands, due to the requirements of compensatory education at all levels below the point of selectivity, and the added costs of advanced education above that point. As the most severely disadvantaged seek entry (what one might call the "cohort of last resort"), the majority's variance in completing that level has decreased to a point approximating zero. Therefore, the probability of any further political support for expansion declines just as the need for compensation reaches the last and

most impoverished groups where the task of achieving educational gains is extremely difficult and expensive. The only time when compensation may actually be available to the last of the hard core impoverished in sufficient amounts may be during unusual periods of economic boom or demographic troughs which threaten the system with a loss of clients.

4.3.5 Growth, Finances and the Contest for Educational Resources

Educational expenditures have increased markedly over time in the United States, the educational system has expanded, and the level of schooling has risen in each generation since 1900. What we want to know more about is how certain expenditures have increased faster at certain times than have others and who benefits.

Given relatively restricted revenues, a decision to spend more money for one objective implies a decision to spend less for some other objective(s). Even within the relatively homogeneous category of education there are significant decisions which have to be made among various objectives.

It was argued in the early 1970's that providing for advanced education, while at the same time meeting the reform agenda below that level (elementary and secondary), would be very unlikely without an overall increase in the resources historically devoted to education. Byrnes and Tussing (1971) argued that ending what they described as the "financial crisis" in higher education "is predicated on what amounts to a rise in the proportion of incremental funds allocated to higher education." A shift in the proportion of incremental funds for higher education in effect meant a corresponding decrease in the proportion of funds for elementary and secondary education.

What would a failure to shift priorities have meant to higher education under these conditions? If the financial crisis in higher education were not solved, it would have meant a slowing down of the aggregate historical growth in educational attainment above grade twelve in

this country. What would that have meant to the nation's economy, manpower demands, technological progress, research and development? What would it have meant to groups of "last entry" into higher education (those who successfully completed high school but were not yet able to enter colleges and universities in large numbers)?

If a shift in revenue funds were not forthcoming, Byrnes and Tussing (1971) argued as follows:

Without the required funds, one or more of the following is necessarily implied: (1) insufficient increases in college attendance rate; unacceptable for social, racial, and economic reasons; (2) decrease in staff-student ratio; unacceptable for structural, social and educational reasons... (3) insufficient increase in real expenditure per staff member; probably impossible, as discussed, and to the extent possible, probably undesirable, as it implies long-term deterioration in the capital stock (including human) of higher education institutions. Since one or more of the three is necessarily implied by a failure to raise sufficient funds, then the issue of whether a financial crisis exists in higher education comes down to whether one believes the funds will be available, and if they are not, whether one believes the three outcomes are undesirable.

At the same time the financial crisis in higher education was being discussed, the Select Senate Committee on Equal Educational Opportunity was taking testimony on the need for compensatory education in elementary and secondary education. The Committee reported (1972) that between 12 and 20 million children should be classified as economically or educationally disadvantaged. Approximately 11 million children were reported to be one or more years below grade level in achievement. Indian, Spanish-surnamed and Black children averaged 4.3 years behind White children at high school graduation. About 17 million children in the United States then were eligible for AFDC funds. Of the 350,000 children of migrant farm workers, 25 percent would not go beyond fourth grade. About 17 percent of their parents were completely illiterate and the median years of schooling attained among adults was 6.2 years (compared to the national median age of 13.0 years). Among the Spanish-surnamed children (approximately 9.2 million then), one-half spoke no English in the home, and about 50 percent had serious language deficiencies at first

grade level. Among 250,000 Indian children the expected dropout rate would be 40 percent and the expected achievement level two to three years below Whites.

Posed against the considerations raised earlier, the crisis might be defined as selecting between the lesser of two evils: effects in higher education as described by Byrnes and Tussing, or a failure to sufficiently meet the needs of the impoverished in the elementary-secondary schools as heard by the Select Senate Committee.

The Select Senate Committee recommended that ESEA Title I funding be expanded by \$1.5 billion, bring it to a level of approximately \$3.0 billion, an additional subsidy at that time of \$300.00 per child eligible for Title I aid. In point of fact, ESEA Title I funding actually decreased after 1972, reaching a level of \$1.46 billion in 1974, then rose to \$2.21 billion in 1978, greatly diminished of course by inflation. The intent of the Committee's recommendation has yet to be fully implemented.

On the other hand, between 1970 and 1978, funds available for college students in the form of student assistance (Educational Opportunity grants, work-study direct loans, insured loans, student loan insurance funds and special programs for disadvantaged) increased from \$617 million to \$2.57 billion. (Both sets of figures, ESEA Title I and HEA IV funds, are in Table 4A.)

Table 4A

ESEA TITLE I AND HEA IV FUNDING,
1970 and 1978 (billions)

	<u>1970</u>	<u>1978</u>
ESEA I	\$ 1.170	\$ 2.212
HEA IV	\$.617	\$ 2.571

SOURCE: Digest of Educational Statistics, Table 158, 1977-78.

Table 4B and Figure 4C depict the collision of interests between those who would benefit from educational resources for the severely disadvantaged versus those who seek educational advantages in college as seen at the federal level.* The resolution is unfavorable for the poor. Since 1960, the drift in both federal and state revenue expenditures has been toward increased allocations for higher education and other postsecondary programs relative to allocations for elementary-secondary schools, although both of course have increased. For instance, since 1960, total federal aid to higher education has increased at a more rapid rate, from a similar base, as compared to total federal allocations for elementary-secondary schools (excluding school lunch and other non-instructional support).

These figures simply reinforce the obvious: as costs have risen proportionately faster at upper levels of the system, increased funds and expenditures have simply followed at both the state and federal levels. We repeat our earlier claim: While the system has provided substantial opportunities for the underprivileged, these opportunities are cancelled, in effect, by very large offsetting opportunities offered to the privileged.

The drift reflects to some extent increases in the average length of participation on the part of the economically advantaged at higher levels of the educational system. The national policy, if indeed there is one, has been not to discourage such growth, or, in Ravitch's words, not to ". . . actually penalize children from advantaged homes as a means of advancing equality."

*HEW's intentions, as expressed in Toward a Long Range Plan (1969) were to compensate for the underrepresentation of qualified low income students in college, and increases in student aid (HEA Title IV) were directed at equalizing opportunity. We would argue (a) that those eligible to benefit would first have to have successfully completed high school, and also have the necessary attributes to gain admission to colleges and universities--what we will call the "advantaged disadvantaged," (b) the eligibility criteria have been expanded to include virtually the entire middle class, and (c) the results to date show no effect toward lessening the class bias in college attendance which gave rise to the policy (cf. Condition of Education, 1976).

Table 4B

FEDERAL EDUCATIONAL EXPENDITURES FOR ELEMENTARY-SECONDARY
EDUCATION, HIGHER EDUCATION AND VOCATIONAL EDUCATION,
1960-1978 (millions)

	<u>Elementary- Secondary Education¹</u>	<u>Higher Education²</u>	<u>Vocational Education</u>
1960	490	829	172
1962	542	1,170	108
1964	666	1,456	237
1966	2,037	2,271	923
1968	2,967	3,240	1,044
1969	2,838	3,346	1,460
1970	3,212	3,910	1,604
1971	3,724	4,895	1,995
1972	3,856	5,172	2,404
1973	4,084	5,964	2,300
1974	4,207	6,063	2,467
1975	4,998	7,991	4,134
1976	4,819	9,605	4,662
1977	5,286	9,203	4,476
1978	5,578	8,002	4,378

SOURCE: Digest of Educational Statistics, Table 155, 1977-78.

NOTES: ¹Does not include School Lunch program.

²Does not include applied research and development, training of Federal personnel or military personnel, or agricultural extension.

**FEDERAL EXPENDITURES FOR ELEMENTARY-SECONDARY,
HIGHER AND VOCATIONAL EDUCATION, 1960-1978**

Source: Digest of Educational Statistics, Table 155, 1977-1978

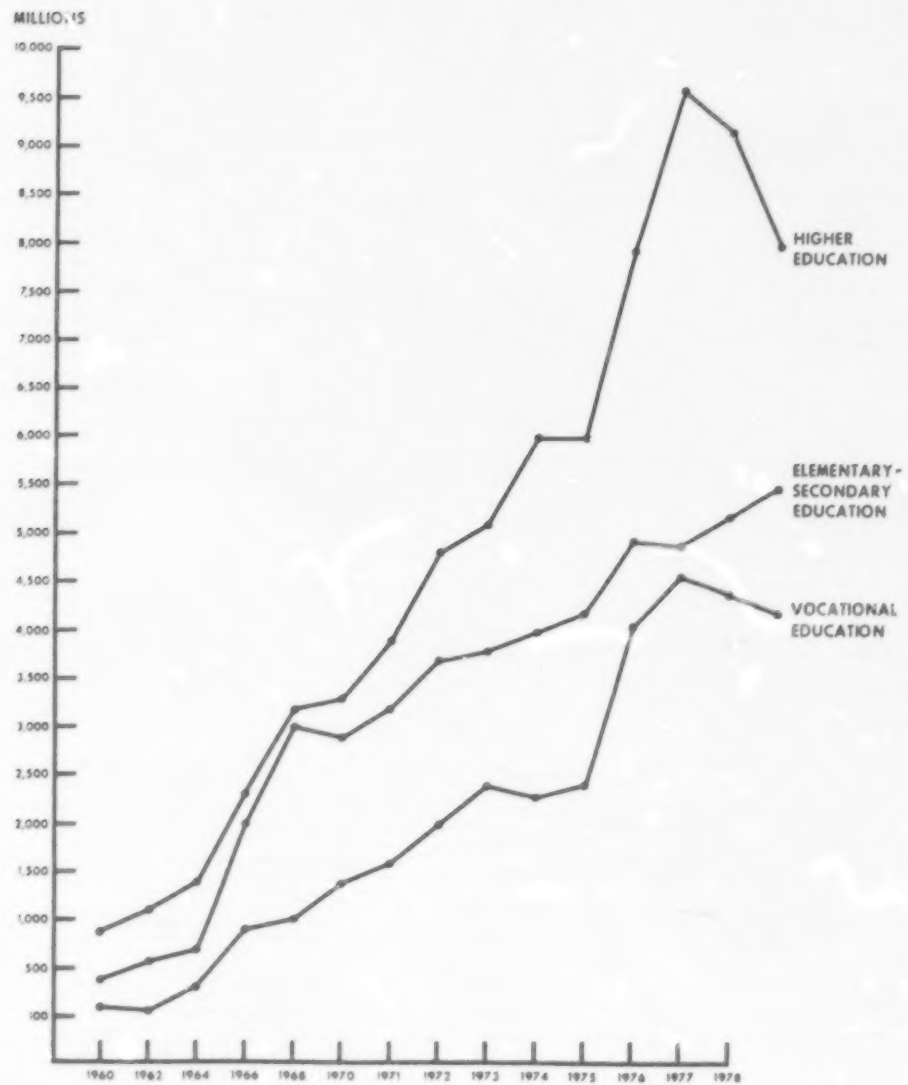


FIGURE 4C

It is also useful to compare allocations for the Elementary Secondary Education Act to allocations for the Higher Education Act from 1966 to 1978. These two acts contain provisions which in a sense epitomize the conflict between educational interests of the poor and those of the middle class, particularly the conflict between the lower middle class and the hard-core impoverished. The Title IV provision of HEA directs funds to the lesser advantaged college students (the "advantaged-disadvantaged"). The recipients of these funds would have to have first graduated from high school and done so with sufficient prerequisites to qualify for college admission. That, of course, eliminates most of the severely disadvantaged. On the other hand, ESEA, Title I funds are distributed on the basis of an economic criterion favoring the poor. In comparing HEA, Title IV and ESEA, Title I, we find the following: Between 1966 and 1978, ESEA, Title I, increased three-fold while HEA, Title IV, increased ten-fold (Table 4C).

Table 4C

COMPARISON OF ESEA TITLE I AND HEA TITLE IV EXPENDITURES,
1966-1978 (millions)

	1966	1970	1974	1978
ESEA Title I	746	1,170	1,460	2,212
HEA Title IV	208	617	1,058	2,571

SOURCE: Digest of Educational Statistics, Table 158, 1977-78.

The pattern at the state level is similar, although there are substantial differences from state to state. However, state allocations to higher education between 1960 and 1976 grew at an annual rate exceeding that of elementary-secondary education allocations. Table 4D shows that the funding base for higher education, as a proportion of state allocations, grew from 19% in 1960 to 28% in 1976.

Table 4D

PROPORTION OF STATE FUNDS ALLOCATED TO HIGHER EDUCATION AND
ELEMENTARY-SECONDARY EDUCATION, 1960-1976
(millions)

	<u>1959-60</u>	<u>1969-70</u>	<u>1975-76</u>
Higher Education	\$ 1,374	\$ 5,787	\$ 12,260
Elementary- Secondary Education	\$ 5,768	\$ 16,062	\$ 31,065

SOURCE: Digest of Educational Statistics, Tables 67 and 128, 1977-78.

If the shift in national priorities as seen during the past decade is permanent, what might be the consequences, particularly for those likely to be adversely affected; namely, the most severely disadvantaged of our largest cities? What is the net cumulative social effect in this country of a 45% urban dropout rate extending over a period of decades? What are the long term social and economic costs when one considers Theodore Sizer's findings ten years ago in Cook County, Illinois, that approximately nine out of ten persons on welfare were high school dropouts? What are the human costs in lost dignity, frustration, crushed aspirations, and alienation? (We are neither arguing nor implying, of course, that a high school diploma will eliminate these problems but we do propose that a larger effort is needed in urban areas prior to the time dropouts leave school, given that our current priorities are politically changeable.)

4.4 THE CONTEST AND INEQUALITY

Why should it be undesirable or unwise for government to "penalize" the privileged in the quest for global equity, other than for the obvious political reasons?

One answer rests with Arthur Okun's argument that such an intrusion by government, i.e., policies penalizing the rich, would threaten the welfare of the majority: the economic pie would theoretically be forced to shrink if carved into too many slices and not consumed in such a way as to maximize the process whereby the most productive persons are placed in the most productive endeavors. Okun's arguments not only please those concerned with human resources, but also those concerned with injury to the process of capital formation, given too large a drag on the economy from government (the so-called "leaky bucket" theory). Okun (1975:48) states:

While the provision of equal political and civil rights imposes costs on society...the attempt to enforce equality of income would entail a much larger sacrifice. In pursuing such a goal, society would forego any opportunity to use material rewards as incentives to production. And that would lead to inefficiencies that would be harmful to the welfare of the majority. Any insistence on carving the pie into equal slices would shrink the size of the pie. That poses the tradeoff between economic equality and economic efficiency. Insofar as inequality does serve to promote efficiency...I can accept some measure of it as a practicality. I can live with the rules of the game that make it fair not to share - just as that lady from Boston insisted. But that is a feature of the universe that I regret rather than enjoy.

Diane Ravitch (1978), taking note of the Okun thesis, states, "more equality means more efficiency, because there would be no incentive to work harder or to be more efficient or to achieve excellence, since good work and bad work would get equal rewards." Ravitch further argues that the encouragement of initiative and innovation has in no small measure contributed to the extraordinary productivity of the American economic system, which has achieved the highest standard of living ever known in the world. This argument is made by Ravitch in her defense of liberalism. But, the unquestioned assumption underlying both Okun's and Ravitch's claims seems to be that relatively large inequalities in income are made inevitable by the requirements of production because unequal rewards are necessary for attracting scarce talent into the most productive endeavors. This argument holds that any transgression of government which substitutes

more equality for less efficiency will harm the welfare of all. In this sense, the education system is seen as serving society best when it serves to identify and develop talent to be allocated to the productive hierarchy through a system of labor markets commensurate with contribution. Theoretically, a democratic, publicly controlled and supported compulsory system of free schools which distributes educational attainments on the basis of merit would be the best assurance that all talent from various social groups would be developed and would receive its due reward. The alternative would be reliance on criteria of social origin.

Liberal reformist views of equity, therefore, are not premised on the elimination altogether of inequalities in the society. Instead, their concept of equity refers to reducing or eliminating the connection between social circumstances of birth and social circumstances of adulthood. The goal is to make sure that access to the existing opportunities (and, necessarily) existing inequalities in the economy is a strict function of merit, rather than social status or family trees. The salient questions for educational policy thus become whether: (a) the schools can (or ought to) fully converge the divergent aptitudes, aspirations and financial conditions (among social groups) present prior to and during the schooling experience, through compensatory policies; or whether (b) schools ought to serve so as to parcel talent efficiently to the economy by spending more on the more able, thereby insuring the greatest return on investment.

Under these circumstances, this sort of tradeoff becomes the basis for a social policy based on maximum social utility, as defined by economic returns on investment. On the one hand, equal educational opportunity reforms propose to sacrifice some efficiency for some gains in equity--meaning more, rather than fewer, resources would flow to need, not opportunity. Maximum returns on investment would be sacrificed for maximum welfare utility.

Policies seeking equity goals and their benefits must be negotiated through a political and economic system described in the foreword to Okun's book as having a kind of split personality, on the one hand seeking to express equity, and on the other, efficiency:

Contemporary American society is, in a sense, a split level structure. Its political and social institutions provide universally distributed rights and privileges that proclaim the equality of all citizens. But its economic institutions rely on market-determined incomes that generate substantial disparities among citizens in living standards and material welfare. The differentials in income are meant to serve as incentives - rewards and penalties - to promise efficiency in the use of resources and to generate a great, and growing national output.... The resulting mixture of equal rights and unequal incomes creates tensions between the political principles of Democracy and the economic principles of Capitalism. Money is used by some big winners of market rewards in an effort to acquire extra helpings of those rights that are purported to be equally distributed. For some of them, it obtains head starts that make opportunities unequal. For some who incur penalties in the marketplace, the result is a degree of deprivation that conflicts with the democratic values of human dignity and mutual respect. Yet some economic policies designed to reduce the scope and magnitude of inequality weaken incentives to produce and otherwise impair economic efficiency [Our emphasis]. At many points along the way, society confronts choices that offer somewhat more efficiency at the expense of equality. In the idiom of the economist, a tradeoff emerges between equality and efficiency.

This split between social values and economic values describes policies which not only create and perpetuate unequal incomes but unequal chances to move into higher status occupations. Any efforts to pursue the equality goals generate clashes of class-interests between those who seek to extract more resource-bearing entitlements (as in the form of compensatory education) and those who seek to limit such entitlements.

Part of our political culture legitimizes the constant (but unattainable) drive toward global equality. Anything less will not suffice to offset the perceived unfair head start enjoyed by those at the top. But this goal is unattainable, given the zero-sum nature of competition for this society's scarce resources, because it is claimed that diminishing economic inequality in the name of educational and social equity carries with it the undesirable sacrifice of shrinking the pie for everyone.

Initially, we present the efficiency vs. equity argument as being descriptive of the consequences of the way resources have been, for whatever reasons, allocated. We don't know in detail the exact political process whereby more money goes for college as opposed to elementary/secondary and vocational education at the federal level, but we have noted that as each educational level becomes saturated with successful completions, more resources become budgeted to the next immediate level, and over time the result works to perpetuate inequality and, furthermore, we find writers like Okun and Ravitch saying that this is alright since some inequality is necessary to spur productivity and, hence, provide the resources which can be devoted to equity initiatives--but we need the resources, first.

But the "equity vs. efficiency" tradeoff is more than a post-hoc description of the effects of resource allocations. We wish to argue that such a tradeoff in part functions to regulate the polity's distribution of educational attainments and resources (whether or not policy maker's actions are motivated by intent or a conscious understanding of the tradeoff). Our argument is this: values representing equity are embedded in the social rhetoric of the polity of education (cf. Bailey, 1976) as well as its actions, but the polity must also distribute credentials and any benefits pertaining through a self adjusting dynamic which serves to defeat the full expression of equity values (as those at the bottom finally reach a target, the target shifts and its value diminishes). And, the polity must receive and distribute financial aid through a political process impinged upon and governed by inherently contradictory assumptions: on the one hand, utilitarian assumptions about capital formation and bequeathing the benefits of privileged position to one's children as a necessary incentive for productivity, and on the other, assumptions about fairness and the equal distribution of political rights. Both sets of values regulate the distribution of educational benefits just as both sets of values regulate the distribution of other benefits (income, social status and mobility) in the larger

society. This claim brings our argument full circle: formal schooling systems exist nowhere in the world to contradict quintessential values of societies in which they reside; and everywhere they do exist they serve to legitimate such quintessential values. In the American system of distributive justice, two sets of values create a dialectical tension which serves to regulate social demands: enough equality to provide incentives for those on the bottom, and enough inequality to reward those on the top.

We have not presented a factual case that resource allocations for education are animated by policy makers' intentions because establishing such intentions empirically adds nothing to the claim that a tradeoff exists and functions to regulate the distribution of educational attainments. To make the case that policy actors were motivated by intent would be irrelevant.* What we do need to demonstrate is (a) schooling

*Since it is unlikely to be the case that some optimal balance between equity and efficiency is explicit in the decision rules as used by the executive in proposing educational budgets or by the legislature in enacting them, or that some optimal balance is an explicit goal of policy-makers, then it will not be the case that intentions of those persons must be demonstrated. The "intentional argument" form is a notoriously weak one (Brown, 1963), and an especially weak one when the actors are politicians. Politicians have all sorts of intentions they cannot fulfill and do a good many things they never intended. The Nixon administration is a good example. Under Nixon the executive did intend (cf. Moynihan 1979) to manipulate the federal education budget so as to effect a tradeoff between funds for school children of the poor (ES&A Title I) and funds for college-age children of the lower middle class (HEA Title IV). Nixon's motivation was in part political--the latter beneficiaries could vote. On the other hand, this tradeoff was consistent with other intentions: to balance the federal budget, reduce fiscal drag on the economy, reduce inflation and stimulate economic growth. These intentions imply a keen awareness of the equity vs. efficiency tradeoffs. But the fact that such intentions can be documented does not make them causal explanations unless and until they can be causally linked to actions and results. The fact is (as we have shown) the federal budget does reflect a reallocation during the Nixon years consistent with the above intentions but such evidence does not establish a causal link. Nixon had all kinds of intentions that were not fulfilled and at least one result that was not intended (for additional reading on the intentional argument form, see Brown, 1963).

represents a societal benefit and therefore is subject to the same normative standards and values as any other benefit; (b) those societal norms and values with which we are most concerned (efficiency and equity) are embedded in political and economic institutions producing a dialectic and resulting tradeoffs, and (c) those tradeoffs serve to regulate demands and distribution of social benefits--one of those benefits being educational credentials. In short, we make the functionalist claim that the efficiency vs. equity tradeoff is a condition causally connected to the maintenance of a system of status distributions (a system we have described as the moving escalator) and that educational attainments and resources constitute simply "goods among many goods" to be distributed. There are three necessary assumptions entailed in this argument:

- (i) only if a balance between equity and efficiency is preserved does the status system maintain itself (in its present form);
- (ii) only the tradeoffs between demands for equity and efficiency preserve that balance;
- (iii) wherever a status system maintains itself, this tradeoff will appear.

We believe the salient evidence rests with the regularity of the social status gap (Blau and Duncan, 1967, and Featherman and Hauser, 1978), and one of its components, the educational attainment gap (Duncan, 1967; Hauser and Featherman, 1975). These gaps have survived a tumultuous century of demands and counter-demands on the political and economic system. The persistency of the gaps represents prima facie evidence that the system does serve to pass privileges from parent to child, but not in such an absolute manner as to quash aspirations of the poor. The relative constancy of the gaps represents prima facie evidence that the system is regulated within tight tolerances--providing some opportunities to the poor, more to the rich, but never enough to either to disturb the equilibrium.

4.4.1 Efficiency: Investments in Education

In addition to the capital formation and incentive arguments presented above, it may also be that marginal products of investment in education for persons of privileged and underprivileged families differ in such a way as to favor persons from privileged families (Levin, 1975; Jencks, et al., 1972, 1979; Bowles and Gintis, 1976). This is a different sort of argument than those offered by Okun and Ravitch but vitally related to the efficiency vs. equity debate. The sources of variance on return to persons of upper and lower classes have to do with the following: lower quantity of services due to hours worked, or unemployment rates; quality of investment--schools may lack sensitivity to the actual needs of the disadvantaged, therefore, skills acquired in school are inferior; institutional biases in promoting people from poor backgrounds to positions of management; attendance in relatively less selective schools which may provide fewer opportunities to be trained in higher paying professions; and information structures which deny equal access to opportunities in the job market in the first place or to promotions once in the job market.

Whatever the exact causes, the empirical evidence suggests that return on educational investments in the form of income to individuals is higher for the privileged than for the underprivileged. White males from high SES families earn 66 percent more income over a lifetime than low SES white males--with identical levels of education (Bowles and Gintis, 1976). Economic return on educational investment for white males is approximately twice that for Blacks and women with equal credentials, suggesting powerful market forces (although the economic effects of college completion are much more equal for black and white males).

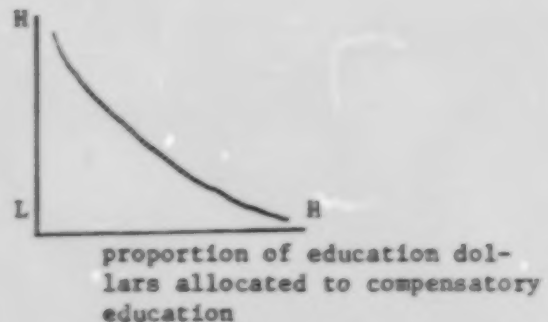
The differences in return on educational investment are apparently not due to differences in mental skills. IQ alone does not explain the effects of education on income differences between SES levels. Top decile SES sons have a 43.9% chance of ending up in the top decile income group, and a 40% chance holding IQ between groups constant. Chances

of ending up in the bottom decile (5.5%) are only slightly affected by holding IQ constant (4.2%) (Bowles and Gintis, 1976). IQ alone also does not explain the effects of education on income, independent of family background. The 90th percentile in education level predicts a 10 to 1 advantage in reaching the top decile of earnings compared to the bottom education percentile (Bowles and Gintis, 1976). Holding IQ constant reduces the advantage to only 8 to 1. Bowles and Gintis (1976) argue that the mental skill demands of work are sufficiently limited, the skills themselves are sufficiently varied, and the possibilities for on-the-job acquisition of skills sufficiently great that skill differences, after criteria of race, sex, age and credentials, are of little economic consequence.

Although the top fifth income earners average only slightly more than one year of schooling above the next three-fifths of the income distribution, the top fifth earns 41% of all income compared to a combined total of 53.7% for the next three-fifths (24.1%, 17.6%, and 12%, respectively--U.S. Department of Commerce, 1974). And, also, only about one-half of the total income variance is due to differences in salaries and wages; of that difference only about 25% is explained by level of education (Bowles and Gintis, 1976).

Given the advantage in income returns for high SES offspring due to attainment, plus the income advantage due to higher levels of skills acquired for equivalent schooling years, the aggregate tradeoff effects might be posed as follows:

overall rate of investment return from education expenditure



Since the disadvantaged underachieve in school substantially, and given that achievement and years of schooling are related to individual's income, if only modestly (accounting for no more than 16% of the variance), equalizing years of schooling for all social classes would (a) be very expensive, perhaps requiring a permanent shift of resources away from education of the privileged and (b) would have very little effect on individual incomes or on income distribution. We don't know, actually, what effect on incomes, if any, reducing educational attainment among the advantaged would have. We only know that equalization of attainment for groups in the middle ranges of income has had virtually no redistributive effect on incomes in the middle classes. Theoretically, if those at the top of the income spectrum receive less education and those at the bottom receive more, neither groups' percentage of income earned is likely to be much affected (since the correlation between income and education is small), but if incomes were affected at all, and the effects were equal among the various income groups, the losses in total dollars would be greater at the top than gains in total dollars at the bottom.

It follows from the earlier argument, i.e., lower individual returns on educational investments for the poor, higher returns for the rich, that fully realizing the goal of equality in the distribution of education may be achieved only at the expense of the goal, "efficiency." (Also entailed in this argument is an assumption that measured test scores vary with SES, and that equalizing the amount of education of high and low SES offspring may have the secondary effect of reducing overall test scores.)*

Raised by the tradeoff argument is the question of social utility. Does it make any difference in subsequent measures (such as successes on the job) if we were to allow lower achieving students to

*The changing social composition of college-bound seniors taking the SAT is identified, for instance, as a major contributor to score declines in the 1960's and early 1970's (CEEB, 1976).

advance further in school? Is there a strong, real relationship between test scores and productivity, income earned, return on investment of educational dollars? Not according to the findings of Bowles and Gintis (1976). Mental skills, independent of educational attainment, explained little variance in income. Jencks, et al. (1979:185) seem to verify that finding:

If abler men learn more from a given educational experience than less able men, and if economic benefits of educational attainment depend upon learning, the benefits of schooling should be greater for men with high initial test scores than for men with low scores. Certainly, economists have traditionally assumed that this was the case and have used this 'fact' to explain the greater likelihood of abler men remaining in school.... Our data do not, however, support this expectation. There are few significant differences between schooling coefficient(s) across ability groups in our samples.

Jencks, et al. (1979:186) conclude, "But abler students presumably find schoolwork less onerous, so their persistence in school is easy to explain in terms of lower psychological costs."

Moreover, is it clear that advanced schooling for the underprivileged would really matter because it would affect efficiency? Or would this change matter because it reflects something else--a distribution of one attribute of privileged positions (i.e., education) essentially at odds with present social order? Is there greater benefit (return on investment) in producing 10 Ph.D.'s, LL.D.'s, or MBA's for advantaged kids than in producing 600 high school graduates among the poor? We think the answer rests with the way education as an institutionalized process attempts to maintain social legitimacy in a capitalist society: By distributing credentials (one of the key attributes of social status) on the basis of social class and according to the interests of employers who want to maintain a competitive work force as an incentive to workers. That is, if schooling makes it possible for employers more easily to replace workers with others of comparable skills, then employers are satisfied because control and manipulation of workers is assured. Massive compensatory education would expand the number of persons with relevant

skills and credentials, definitely in the employer's interest (unless and until compensation became a drag on economic growth and consumption), but would diminish the relative value of such skills and credentials for everyone, and therefore would not be in the political interest of those with an existing monopoly on credentials.

4.5 SUMMARY: THE "PROCESS" AND "THE GOOD"

To go back to an earlier question: How are the structural arrangements, and dynamic features of the educational system arranged so as to "reproduce inequalities?" More of the offspring of advantaged than the disadvantaged do come to school cognitively stimulated and advanced in the skills to be learned. But when this is true of the poor, their school experience does not differ markedly from the affluent. It is interesting to note that for students with equal test scores, grade point averages do not favor the economically advantaged. Jencks, et al. (1972) conclude, therefore, that teachers do not directly reward students according to social class. But it must be also understood that the distribution of traits teachers prize is strongly associated with social class. Fewer of the poor have such traits.

The great hope of American liberal educational reform has been, through compensatory education, to attempt to converge divergencies in aptitude present at the beginning of the schooling experience. Inequalities would then be the result of differences in abilities and effort, and independent of family background. When this condition is satisfied, the liberal view of equal educational opportunity will have been achieved. Ravitch (1978) states: "[equal opportunity] suggests that individuals succeed according to their individual merits and that others do not succeed for lack of those same qualities."

Our explanation for the failure of the liberal ideal ("careers open to talent") is at its most fundamental and simple level an economic argument. Resources are allocated in response to supply and demand forces emanating from the educational system itself, and, indirectly,

from the labor market as the consumer of that system's products. The supply and demand dynamic operates at a number of levels. Resources are allocated to those levels of the educational system in which there is a greater demand, i.e., number of potential entrants relative to existing supply or "capacity." Hence, resources flow to levels where capacity is strained because of increased demand. Supply, therefore, follows a pattern of ascending demand. As more finish high school, more want to enter college (in part because the high school diploma is no longer scarce and, hence, confers less social benefit) and this strains capacity at the college level, thus, leading policy makers to allocate more resources there. But, given finite funds any response to this "demand" means less funds for children experiencing school failure before grade 12. Therefore, what looks like a rational response to increased demand, results in an inequitable distribution of resources, since, we know that (a) it takes more funds to achieve school success for a poor child, and (b) because of opportunity costs, presumably, and class-determined family differences in aspiration, more of the rich will continue to attend college even if tuition barriers were eliminated. In short, more money goes to those levels of the educational system which are most apt to be populated by the well off.* The policy process, it seems, acts so as to supply resources in reaction to demands from the educational system. These demands, in turn, are initiated by diminished supply or capacity of that level of the educational system which is immediately above the level in which there has been the greatest growth in attainment.

Our explanation for growing demand is that demand (i.e., which results from saturation of a given educational level) is a function of

*Other supply-demand dynamics in our explanation include: the nexus between aspiration and the job market (i.e., the opportunity costs are different for different classes of staying in school longer rather than shorter); the supply of credentials vis-a-vis the demand--as a level of attainment becomes more universal and equal, the economic benefit depreciates.

aspirant's "readings" of opportunity costs. Mitigating this process are the social class differences in parental expectation, peer pressure, psychological tolerance for schooling and ability to defer lost income, which favor continuance for a larger fraction of the privileged than the poor. We present a prima facie case, based on temporal coincidence, for the hypothesis that supply (public policy resource allocations) follows demand (saturation of different levels of schooling).

These variables cited above which affect attainment levels of poor and privileged are discussed in more detail in the next Section, 5, "Model of the Contest for Educational Resources."

5.0 A MODEL OF THE CONTEST FOR EDUCATIONAL RESOURCES

5.1 INTRODUCTION

The model can be articulated in several forms differing in their levels of detail and complexity. The most detailed and complex articulation of the model is contained in a set of simultaneous mathematical equations (see Appendix II for a complete listing of equations, initial values and parameter specifications). This mathematical model programs the computer to simulate the interplay of forces which produce and maintain the educational attainment gap.

In the section that follows (Section 5.2, "What the Model Simulates"), a flow diagram illustrates the basic student movements through the schooling system and into the labor force. The next section (5.3, "Model Dynamics") depicts the model as a dynamic system through a series of causal-loop diagrams. The causal-loop diagrams show the interrelationships of model variables as those variables produce the educational attainment and resource gaps. Following the section on model dynamics are the more detailed operational definitions of key variables (Section 5.4, "Defining Model Variables"). The definitions are represented in a series of tables showing bi-variate relationships in the model that produce differential termination rates for upper and lower SES students. (The tables appear in Appendix I.)

5.2 WHAT THE MODEL SIMULATES

At the simplest level of explanation the model simulates the dynamic causes of a persistent gap in educational attainment of American adults from upper and lower social class backgrounds, despite rising levels of attainment overall. All American offspring enter school at rates indistinguishable by social class but exit at different rates, identifiable by social class. The model depicts the dynamic interactions of school and social factors which produce the differential exit rates.

One may visualize the way in which the model simulates the attainment gap between social classes across generations as two groups (upper and lower classes) riding up an escalator. Members of the two groups step off the escalator at different points creating two gatherings of people on the side steps, no longer moving but separated by the distances they had ridden. By reproducing themselves the two groups add more people over time who can ride up the escalator. Model structures and dynamics simulate how long the rides will last, who will get off and where. Riding higher up the escalator provides an incentive for those who follow to ride still longer. At any one time, the standing (level of schooling) of the lower social class may exceed the level of schooling attained in a previous generation by the upper social class, but the educational attainment gap is represented in the model within cohorts and is relative, not absolute (just as an "impoverished" family, by 1980 standards, may have more income than the average family of a previous generation).

The educational system within the model is divided into three sectors: elementary, secondary and postsecondary. As illustrated in Figure 5A, separate flows of students designated as either upper or lower status advance from one sector to the next or terminate. Those terminating enter a pool of unemployed and await absorption into the labor force. The time that it takes to absorb unemployed workers depends on job availability, generated by the model. Once employed, workers may become unemployed again as economic conditions dictate. In the model, jobs for terminators of each sector of the schooling system are created as a function of available labor supplies (terminators from a given sector plus terminators from higher sectors). In turn, jobs and, indirectly, unemployment, have causal effects on termination rates from school (the latter through effects on aid to education).*

*As unemployment increases, "aid to education" increases, and vice versa, thereby affecting termination rates. Generally speaking, periods of prolonged unemployment have been followed by federal increases (continued)

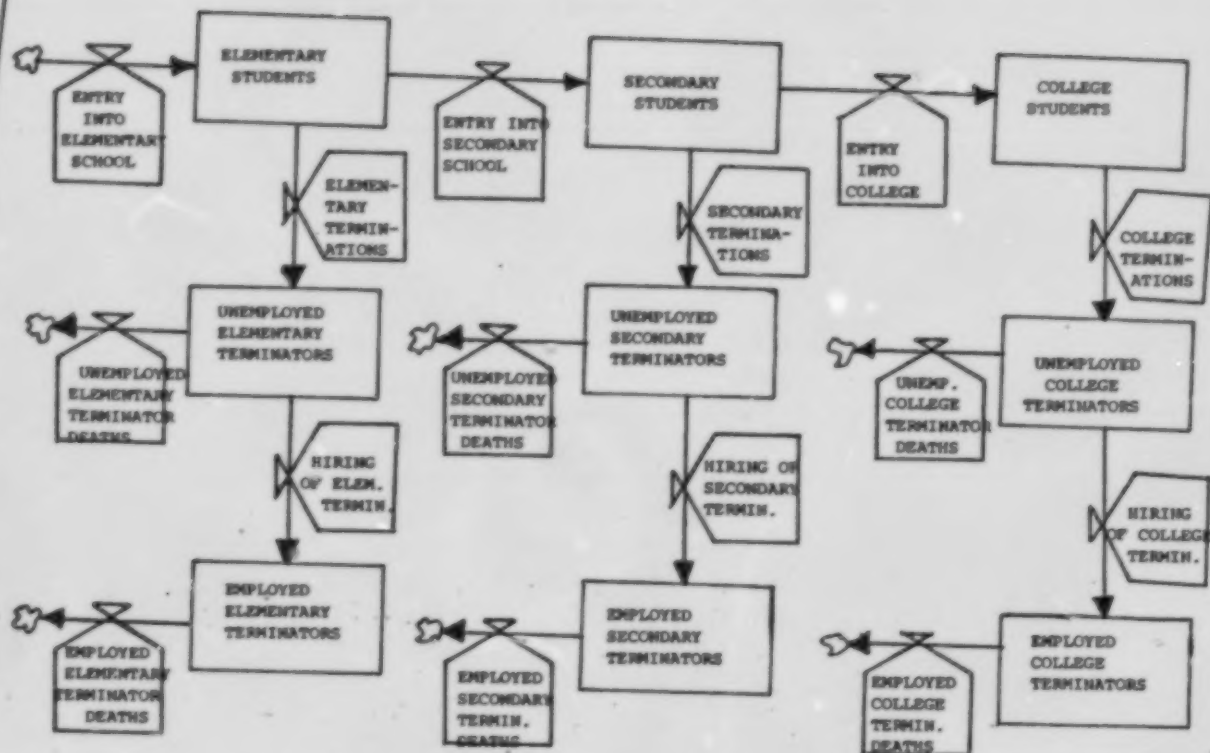


FIGURE 5A. AN OVERVIEW OF THE PEOPLE FLOWS WITHIN THE MODEL.

The number of students in a sector of the school system at any given time is defined as the integral over time of those entering the sector minus those who have terminated or advanced. Termination rates represent outflows of students who fail to advance to the next sector. The term, "dropout," is not used because it implies school leaving by grade level. "Dropout" is substituted for in the model by "terminator," which better describes that fraction of students who do not advance to the next sector.

5.3 MODEL DYNAMICS

The model is depicted below in the form of a set of simple causal loop diagrams. These diagrams describe in minimal detail interactive relationships among model variables. The model is shown to consist of the interactions among seven causal-loops. The first loop will be illustrated in Figure 5B. Thereafter, in each successive figure, one more loop will be added.

5.3.1 Loop 1: Rising Attainment

Loop 1 constitutes the driving force behind the expansion of education in the United States (Figure 5B). The diagram shows a positive causal relationship between enrollment and educational attainment (shown by the "+" sign at the head of the arrow connecting those variables). As enrollment rises (as a proportion of population) at all levels of schooling, average educational attainment rises, the pool of job applicants begins to reflect higher levels of schooling and, employers hire better educated applicants. Thus, as indicated by the "-" sign at the next arrow-head, job opportunities for those terminating lower levels of schooling began to shrink relative to the proportion of jobs which had previously

in aid to education, e.g., the Eisenhower recession was followed by substantial increases in federal educational aid, even before the enactment of ESEA, OEO and the other anti-poverty programs which had at their core the assumption that more aid for education would help to eliminate long-term unemployment.

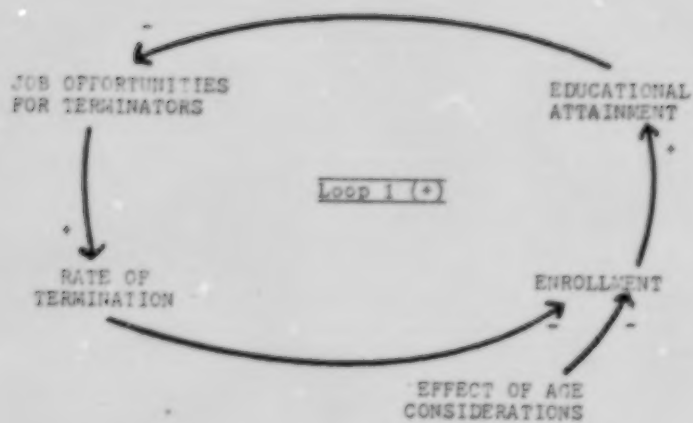


Figure 5B

The Basic Dynamics of the Rising Trend in
Educational Attainment in the United States

been available to terminators at those same levels. As job opportunities for terminators decline, students who otherwise might have left school to work now tend to remain longer in school. Thus, the rate of termination can be seen to be tied positively to job opportunities for terminators ("+" sign at arrowhead).

Finally, the loop closes. As the rate of termination declines at different levels of schooling, enrollment continues to increase--thus triggering renewed escalation in educational attainment. This depicts the basic cycle of "educational inflation" in the United States (see Section 4.0, "The Process").

5.3.2 Loop 2: Attainment Gap

Figure 5C shows the central dynamic in the model maintaining the social class gap in educational attainment. It can be seen in this loop that differences in socio-economic status (SES) underlie initial variations in parents' educational attainment and parental expectations for achievement. (Note that SES is an exogenous variable in the model.) These, in turn, have contributed strongly to differences in educational achievement which, through the effects of standards, help to determine the different rate(s) of termination, enrollment and educational attainment. The critical impact of this series of causal effects in maintaining the social class gap in educational attainment is the intergenerational persistence of initial differences in parental education and expectations.

5.3.3 Loop 3: Allocation of Resources

Figure D shows how the allocation of educational resources works to reinforce the existing advantages of the children of the well-to-do. Since upper-SES children tend to stay in school longer, they are disproportionately enrolled in school, especially at the upper levels. Thus, resource allocations work to the aggregate benefit of upper class students, an advantage which is reinforced by the fact that schooling is progressively more costly as students progress through elementary, secondary, undergraduate and graduate education.

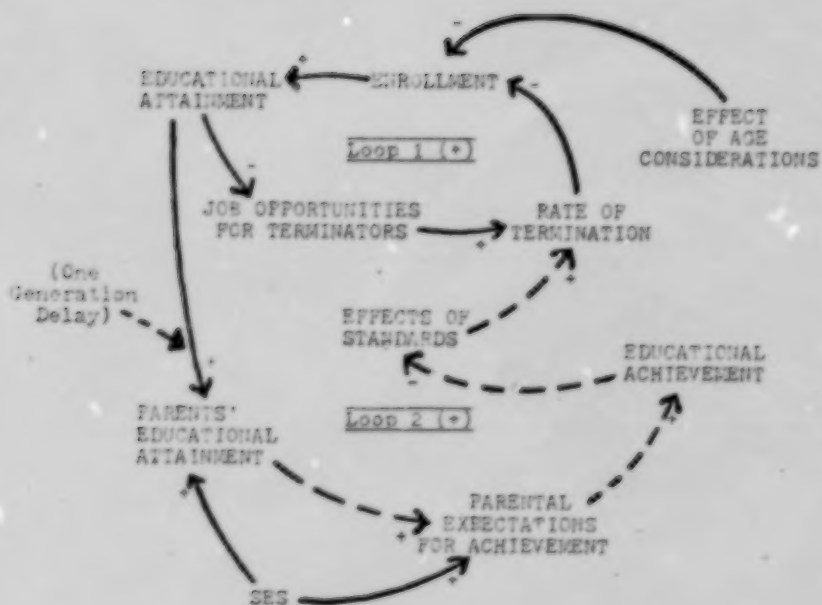


Figure 5C

The Main Dynamic Maintaining the Social Class Gap in Educational Attainment in the United States

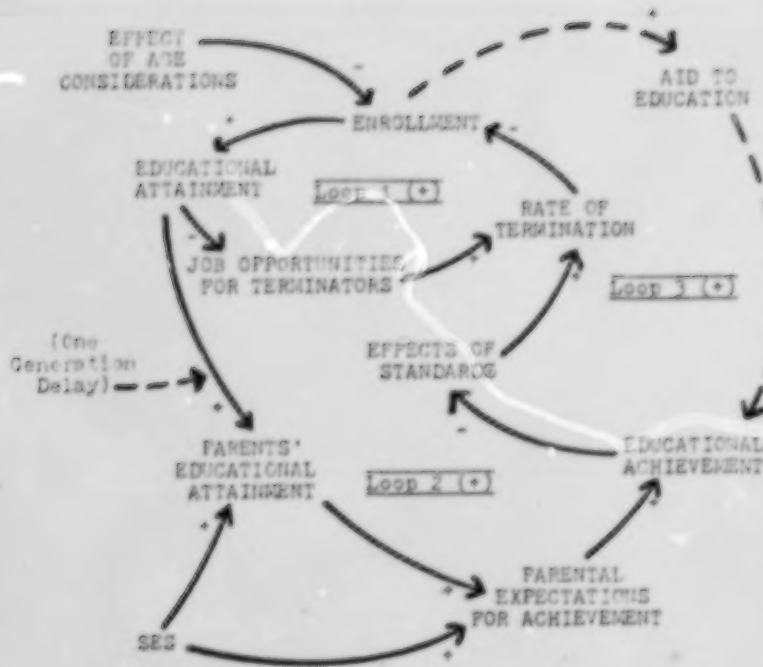


Figure 5D

The Dynamics of Per Capita Apportionment of Educational Resources in Maintaining the Social Class Gap in Educational Attainment in the United States

5.3.4 Loop 4: Effect of Attainment Gap on Capacity

Figure 5E illustrates a counter-pressure generated by inequities which are perceived to rise beyond acceptable limits. As the education attainment gap widens, there is a press to reduce standards permitting disadvantaged students to attain higher levels of schooling in order to close the gap.

5.3.5 Loop 5: Effect of Perceived Gap on Aid to Education

Figure 5F depicts the dynamics of variation in traditional per capita allocations of aid to education. In this causal-loop, aid to education is causally connected to the perceived social class gap in educational attainment. Aid to education is allocated with a social class bias in one direction or another: on the one hand, to prevent social class educational distinctions from becoming too great, and, on the other, to protect upper class interests in maintaining differences in educational attainment between themselves and the poor.

5.3.6 Loops 6-7: Effect of Capacity on Standards and Enrollments

Figure 5G depicts the inclusion of two additional causal-loops. The two loops, together, depict the dynamics of relatively short-range adjustments of the educational system to changes in the capacity/enrollment ratio. The essence of this dynamic lies in the interplay among capacity, enrollment and standards. Capacity adjusts over time to variations in enrollment. However, adjustments in standards cushion the effects on the educational system: as enrollment drops below capacity, pressures are generated to lower standards as a means of temporarily sustaining enrollments. Conversely, especially in higher education, there is a tendency to raise standards, at least temporarily, in the face of unusual increases in the numbers of applications for enrollment. Then, as capacity adjusts over time, standards tend to regress toward the initial state.

The Dynamics of the Use of Standards to Maintain the Social Class Gap
in Educational Attainment in the United States

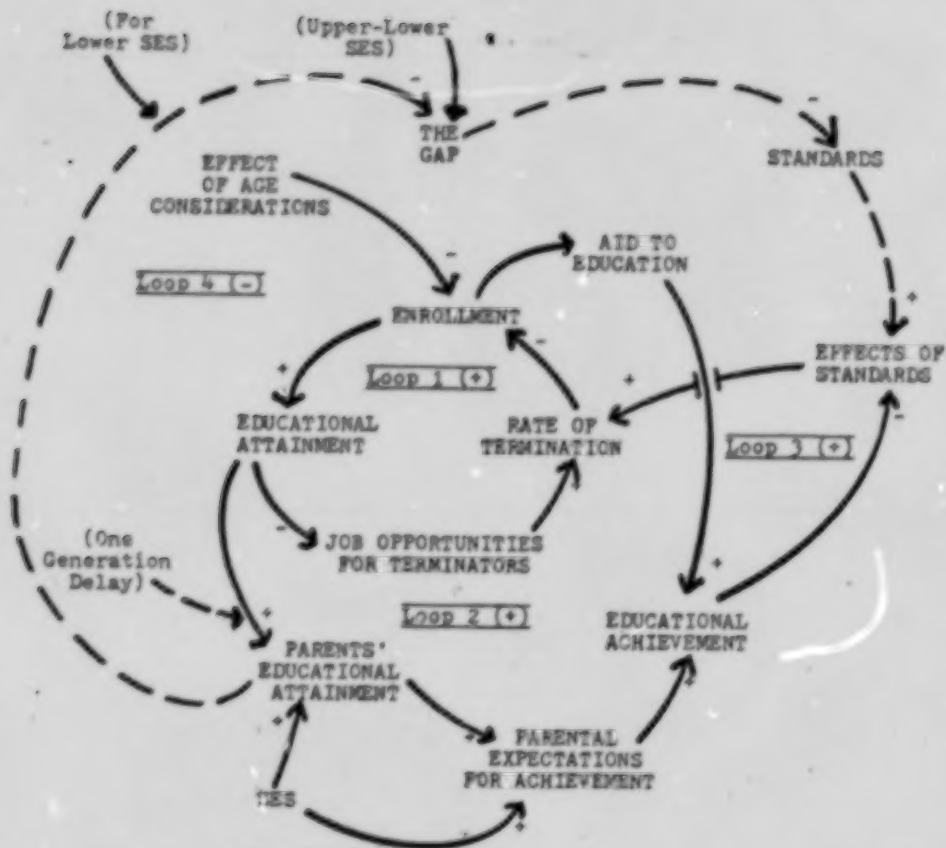


Figure 57

The Dynamics of Aid to Education to Maintain the Social Class Gap in Educational Attainment in the United States

(Upper-Lower
SES)

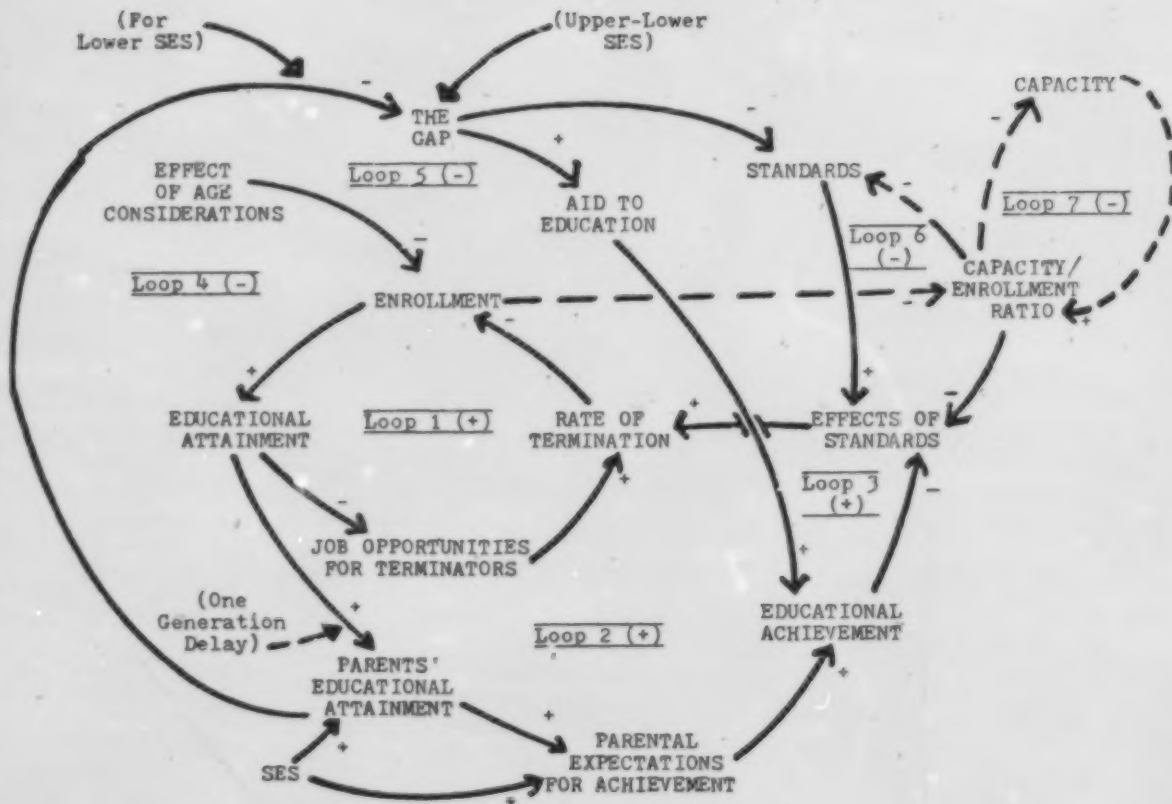


Figure 5G

The Dynamics of the Capacity/Enrollment Ratio Within the Educational System

5.4 DEFINITIONS OF MODEL VARIABLES

Underlying the structural arrangements in the model which produce and maintain the educational attainment gap is an assumption that within the polity of education a bias favoring the upper class is never permanently pushed from a state of equilibrium, that state being determined by optimal social and political stability. Too much bias favoring the upper class would result at some point in a garrison state, too little bias would lead at some point to capital flight, both unstable conditions. (We don't know what the extreme points are but further development of the model might yield useful insights as to what limits are tolerable by forcing disequilibrium to very wide states or very narrow states in the attainment gap.)

The primary vehicle through which equilibrium is maintained (apart from the structural arrangements of schooling itself, i.e., achievement, standards and capacity) is the allocation of public funds, and that allocation of funds reflects perceptions of both social groups as to the shifting relative advantages and disadvantages such allocations carry. Indeed an examination, for instance, of the federal allocations to education suggests (with appropriate disclaimers) the ebb and flow of pressures favoring one and then the other social class. We would argue that the public budgeting process is a zero-sum balancing act in which various interests succeed to a greater or lesser extent in gaining at someone else's expense. Given this underlying assumption, we conclude that policies which overall restrict educational funds will automatically injure the interests of the lower social class more than the upper social class, even though the upper social class may also receive less. Upper class interests are in fact reinforced, relative to lower class interests, because they are better able to replace with private means lost public aid while the lower class cannot. The model mirrors this assumption by structures that cause aid to education to have both more negative and positive consequences for the lower social class (see Section 5.4.1, "School

Variables"). As aid increases, the beneficial effects for lower SES offspring are greater and when aid decreases, the negative effects are greater.

Two categories of variables within the model produce a differential in terminations and advancements. The first of these variables is termed "school variables," and the second is termed "social variables." School variables include (a) aid to education, (b) capacity, (c) standards, and (d) achievement, and time to change achievement. Of these factors, only aid to education, achievement and time to change achievement have differential effects on termination and advancement of upper and lower SES students. The other factors affect progression of all students but do not differentially affect students of upper (UES) and lower (LES) social status. School factors are discussed in more detail below.

Social variables include (a) jobs, unemployment and time to absorb school terminators into jobs, (b) parent expectation factor,* and (c) age considerations. Of these, only time to absorb school terminators into jobs has a differential effect on terminations and advancements. The other variables affect progression of all students. Social variables are discussed in more detail below.

5.4.1 School Variables

(1) "Aid to Education." Aid to education is operationally defined in the model as the fraction of GNP devoted to total educational expenditures without distinction as to public/private expenditures or as to sources of revenue. Aid to education is operationally separated in the model as aid to upper and lower SES students. Allocations to each group are determined by costs per pupil times pupils in each sector at any given time. Cost differentials by sector are represented in the model as follows: elementary costs = 1, secondary costs = 2, and college costs = 3. Changes

*Parent expectation factor is discussed under School Variables since it affects student achievement directly in the model.

in aid to education are produced in three ways: (a) indirectly, by differentials in termination rates (more upper social class students advance to higher sectors thus shifting allocations toward UES offspring); (b) directly, by a built-in homeostatis mechanism (as overall aid increases or decreases to UES or LES, pressures to redress the imbalance are generated); and (c) by the perceived attainment gap and unemployment. Perceived attainment gap and unemployment are discussed below.

As unemployment of lower socioeconomic status terminators increases relative to upper socio-economic status to terminators, fraction of aid to education to lower SES increases and as unemployment of lower SES decreases, aid to education for lower SES decreases (Figure 5H).^{*} Implicit in the relationship of unemployment and aid to education is an assumption that government allocates money to combat long-term secular unemployment trends through educational programs.

Perceived increases in the educational attainment gap produce less aid for upper SES students (UES) and more for lower SES students (LES) (Figure 5I). Perceived decreases in the gap produce the reverse effect. The effect of educational aid on termination and advancements (Figures 5J-5Ø) is operationalized in the model as follows: (a) as the fraction of GNP devoted to educational aid rises above an initial value, progression of all students in all levels is directly and positively affected, and vice versa; (b) the effects of aid on progression vary with level, increasing in magnitude at each higher sector; and (c) changes in aid affect lower SES offspring more negatively and more positively than upper SES offspring.

Finally, the model represents an assumption that overall effects of aid on lower SES terminators increase at higher levels of the school system, much less so for upper SES. This assumption is consistent with the increase in fraction of private funds thought to be needed at higher levels of schooling for all students, and with the assumption that

^{*}Figures 5H through 5BB appear in Appendix I.

from the elementary level and college capacity affects progression from the secondary level. As overcapacity (more students than capacity) arises in the level above it pushes toward a reduction in entry from below (Figure 5Q). This represents an assumption that the system delays progression at higher sectors as larger cohorts are passed along by not being able to add capacity immediately. As operationalized in the model, capacity also affects terminations and advancements indirectly by affecting standards. As overcapacity arises in each level, the effect on standards is positive (i.e., standards rise) (Figure 5R). As undercapacity (more capacity than students) arises in each level the effect on standards is negative (standards fall). In particular, we would expect this response in the college level where market behavior is a more appropriate analog. However, it may be argued as well that at the elementary and secondary levels standards will be adjusted to keep the maximum number of people from terminating when students are scarce, and the minimum number when schools are overcrowded.

(iii) "Standards." As operationally defined in the model, standards are represented by a variable initially set equal to lower SES educational attainment (LEA), a value averaged from the preceding 25 years of schooling attained for all lower SES terminators at all levels of the schooling system. Standards are caused to change in the model by two factors: capacity and the educational attainment gap. In the model, the concept, "standards," is meant to represent a minimal normative condition to be met through achievement, causing some fraction of students to fail to enter the next higher level of schooling because those students fail to meet the minimal standard of that level, and some fraction to progress because they have succeeded in meeting the standard (Figure 5S). By choosing to define standards in the model as years of schooling attained by the lower SES school terminators, the entire issue of what is a standard and how it is derived, is side-stepped. The rationale is a simple one. The crucial consideration, in modelling terms, is whether the factor,

"standards," will cause students to progress or terminate, and how, structurally and dynamically. Our decision is to allow standards to cause terminations whenever standards exceed achievement for either social group and to allow standards to vary. With regard to causing terminations, the reality is that standards do cause terminations in two ways: first, by causing those unable to meet standards in a given level to terminate before graduating, and second, by barring, in effect, entry to the next level. The profession, public and polity do take seriously the meeting of standards (as evident in the concern regarding credits, certificates, degrees, grades, and standardized test scores). These forms of meeting standards constitute the "tokens of exchange" among schools and colleges for the purpose of advancing students from one level of the system to the next or transferring students within levels, or for prohibiting such advancements or transfers.

With regard to standards varying in the model, it is our assumption that in reality standards do vary, presumably because either the public, profession and polity judge that students need to know more, or something different, or that a time-fixed-cohort standard has become untimely or irrelevant. Whatever the case, standards in each level can go up or down, in operational terms, meaning that if the elementary standard rises by a value exceeding its initial value, fewer students will progress to the next level, and vice versa. Standards can go up or down in the model for two reasons: change in capacity (described above) and change in the perceived gap. The perceived gap in educational attainment affects standards as follows: as the normal gap is departed from, the effect is to cause standards to atrophy or grow (Figures 5T-5V). If the attainment gap is wider, then standards erode. If the attainment gap has narrowed, then standards increase. The logic of this structural arrangement in the model contains several elements which follow.

First, it is assumed that the changed condition of the attainment gap is perceived by the profession, public and polity, i.e., it is

perceived that more disadvantaged offspring are failing to continue in school, or are succeeding in continuing in school, and the same for advantaged offspring.*

Secondly, it is assumed that given "injury" is perceived by either social group, the advocates of that group within the public, polity and profession (a) identify such harm; (b) act to remedy such harm; and (c) act to remedy such harm by effectively seeking to change the normative condition which affects terminations (learning standards).** By causing such standards to atrophy (if the injured

*The data reported in the annual USOE publication, The Condition of Education, showing, for example, the probability of attending college by income classification, or the work of the Duncans, David Featherman, Robert Hauser, or the work of Bowles and Gintis or Henry Levin on the probability of school attainment by social class suffice as examples of awareness from the polity and profession. Indeed, as regards the polity, so concerned was Robert Kennedy with monitoring the effects of Title I funds that he forced the Congress to require by law that annual evaluations be conducted. There is a special census survey, the Survey of Economic Opportunity (SEO) which compiles a massive amount of information about characteristics of the poor, including schooling level (see Rivlin, 1971, page 11). Media reports, material distributed by and to school boards, the Education Commission of the States, National School Boards Association, NAACP, and the like reporting on conditions reflecting advantages or disadvantages in school for inner city families, Southern Appalachian poor, Blacks, migrant workers, and similar reports on hard-pressed middle class families whose children can't afford college, combined with notable Supreme Court and State Court decisions (Rodriguez), all constitute evidence of public sensitivity to the relative socially conditioned participation of families in schooling. We assume that none of these groups intends to compute an index called the "education attainment gap" but we argue that this society is very conscious of the relative advantages of social groups in one of its most cherished institutions, if not in the detail of daily reading of the "gap index" (re, as a Dow Jones Industrial Average of school attainment), then certainly in general terms there is awareness of the relative gains and losses of social groups.

**The current version of the model makes no attempt to explain how the interests of either social class operate through the polity to actually change standards or how the "perceived gap" is actually
(continued)

group is lower SES) terminations due to standards are reduced. In the model, a reduction in standards will always benefit the lower SES students in all levels more than upper SES because a larger fraction of lower SES students terminate in each level. In this sense, it can be argued that standards are lowered, ceteris paribus, by the system's response to pressure from the poor in the form of dual standards, and, it should be noted, with no intent to accelerate academic achievement in order to bring the poor up to initial academic standards. It may be argued that vocational education represents such dual standards. At the college level, standards have been adjusted, to permit progress of the poor without attention to achievement by creating virtually a separate system of schooling - the community colleges. (It is also very important to point out the converse example of colleges and universities "tightening up" standards in the face of perceived laxity in basic academic preparation - a strategy that will always serve the interests of the upper social classes because they are proportionately better represented among those with higher aptitudes.)

perceived, or how the advocates of relief actually change standards but the reality we have suggested exists might guide such a simulation in later versions of the model. The model does include a delay representing the time it takes for the perception to be translated into actions to change standards. In the case of unfair advantages created by conditions at birth (race, sex, handicap) the avenue of change is clear. Schools have been required as part of the remedies of the courts to in fact readjust standards. Blacks and the handicapped, to a lesser extent, women, have in fact progressed further in school as a direct result of banning tracking systems, discriminatory testing and by progressive quota procedures. Less clear is the direct avenue by which economic class remedies affect standards. Indeed, the Supreme Court in Rodriguez took the position that economic class should not be afforded constitutional protection. The pressure from economic class differences alone may not directly change school standards. Such effects may more indirectly affect standards through association with other conditions such as race and by virtue of the fact that more of the poor simply go to school longer, forcing standards to adjust to their presence.

(iv) "Achievement." Achievement is operationally defined in the model as years of schooling. The parental expectation factor adds two years to upper SES and one year to lower SES achievement. The differential in parent expectation factor allows achievement of upper SES students to be higher than lower SES even if parental attainment is equal for both; thus, advancement in school is biased toward upper SES. Offspring of upper social class families seek to advance further in school and do so even when their achievement levels are lower than offspring of lower social class families. In each sector of this model the ratio of achievement/standards is used to determine progression to the next sector or, conversely, termination (Figure 5S). If the ratio falls below 1.0, then more students terminate rather than advancing to the next sector, i.e., if achievement falls below standards, terminations increase, and if achievement rises above standards, terminations decrease.

Two factors cause achievement to vary in the model: parental expectation and aid to education. Either factor may directly increase or decrease achievement of either social group, independently.

Parent expectation is operationalized in the model by years of schooling attained by parents. Thus, a parent, regardless of social class, with, say 16 years of schooling attained, expects 16 years of achievement from offspring, plus the class-biased expectation factor (one year for lower and two years for upper status). As parental years of schooling rise in the model, expectation rises. Since upper social status parents have a higher attainment level, and the expectation factor is biased in favor of upper status parents, pressure on upper status student achievement is higher. (Consistent with effects of parent background on student motivation in linear models, the effects in this model are strong and biased structurally in favor of the upper group.)

Aid to education affects achievement of both upper and lower SES students but the effect is differentiated as to time to advance years of achievement (Figures 5W, and 5X). Operationally, a given unit of increase in aid to education will require more time to raise achievements

of lower SES than upper SES by a factor of two. For example, if aid were doubled, the time to increase achievement of upper SES students would be 2.5 years compared to five years for lower SES students. This assumption is based on reported data regarding achievement of advantaged and disadvantaged students showing that for upper SES the rate of growth in achievement is three years for each two in school, while for LES achievement would be two years for each three in school (Mosteller and Moynihan, 1972).

5.4.2 Social Variables

(1) "Jobs." Jobs affect terminations (failure to enter next sector) for upper and lower SES students through the factor, "time to absorb terminators into jobs." As the time to absorb into jobs increases for terminators from a particular sector of the school system, the fraction of terminations due to jobs decreases (Figures 5Y-5AA). The effect of time to absorb on terminations is the same for upper and lower SES. The difference is in the initial length of time itself. The initial length of time to absorb for lower SES terminators is greater by a factor of two than for upper SES terminators. Job availability has an effect on time to absorb terminators into jobs. As jobs increase relative to terminators, the length of time to absorb decreases, and vice versa. Jobs are created in the model for terminators of each sector separately as a function of (a) available terminators; (b) unemployment ratio; and (c) available terminators above that sector. As more unemployed become available from higher sector terminations in the model, the effect is to create fewer jobs for lower sector terminators (Figure 5BB).

This construction of the effects of jobs on terminations reflects findings from Freeman (1976) and Berg (1970) that college graduates, unable to find college-level employment, move down the labor queue taking positions in the labor hierarchy formally held by terminators at the high school level or even elementary level. As this "bumping" process

takes place, jobs for high school and elementary terminators become less available and, therefore, would-be terminators stay in school longer. We believe this is a powerful factor in determining the rates of terminations in each sector of the schooling system up through high school. However, Freeman (1976) observes in the early 1970s a reverse effect on terminations between high school and college. As the market for college graduates began to erode, the proportion of high school students (particularly white males) entering college began to decline.*

(11) "Age Considerations." As the fraction of total life spent in each sector of the educational system goes down (due to increases in productive life expectancy over time), the effect is to increase progression of both groups to the next sector. When life fraction declines to 40% or lower, it no longer affects progression, i.e., even if life fraction reaches zero, no further positive effect would result on progression. Conversely, if life fraction spent in school rises above 40%, the effect on progression becomes increasingly negative. It is our assumption that this is one of the fundamental limiting factors on educational growth. To use the earlier metaphor, even though the profession, perhaps the polity, may be willing to provide formal education for both social groups over their entire life spans, we believe the public will not participate and will in effect step off the escalator of its own

*The current version of the model does not simulate this Freeman finding. Equations determine fractional changes in entry to college from high school due to time to absorb secondary terminators into jobs, and determine the effects of time to absorb college terminators on college graduation, but the model does not allow the time to absorb college graduates into jobs to affect entry into the college sector. If time to absorb secondary terminators into jobs is long, but at the same time, time to absorb college graduates into jobs is also long, the decision of high school graduates to continue into the college sector should be nullified. In the present model, there is no such offsetting effect.

accord at some point choosing to spend some fraction of their productive lives in other endeavors (raising families, working, pursuing avocations, leisure, recreation or other activities).

We have selected the 40% figure because it represents an historical upper limit of average time committed to schooling in this society. The average age of termination for schooling now is approximately age 20, representing about 30% of total productive life expectancy (age 65) in school prior to entering alternative endeavors. About 20% more of the population will continue on to age 22 or 23 before terminating school, and some much smaller fraction beyond that to age 25 or 26. It is our view that unless productive life expectancy of either social group rises above 65, the natural tendency of people to seek other uses of their time will also serve to limit growth of the educational system. And, of course, one of the reasons why people seek other uses of their time is an economic motivation. Except for a few of the highest paying professions, further investments in a college education beyond the bachelor's level produce declining rates of returns on investment - due in part to lost opportunities to earn income in the peak earning years, with potentially rewarding credentials acquired in school already, and due in part to the very high direct costs of graduate training relative to the added earning power graduate training provides.

6.0 POLICY TESTING

This section of the report contains two parts. The first describes the approach and procedures employed in testing the system dynamics model that was developed in the analysis. The second part describes several model simulations in which alternative policies were examined for their impact on the educational attainment gap.

6.1 TESTING APPROACH AND PROCEDURES

The approach to, and procedures for, testing a system dynamics model differ in several important respects from that used to test the majority of models developed in social science research today. The differences reflect a difference in model purpose.

The great majority of models being developed in the social sciences today have point-in-time prediction as their purpose. For example, recent models have been developed to predict SAT scores and high school drop-out rates during the 80's. In order to generate such point-in-time predictions, most social science models rely upon past data to estimate the coefficients of a set of statistically significant independent variables. The resulting historically-derived correlations are then used to extrapolate the future time-course of the variable or variables of interest. Point-predictive models are tested by comparing model-generated behavior against the actual historical behavior of the variable(s) being predicted. Statistical measures of goodness-of-fit, such as the R^2 , are applied. A high R^2 value, indicating a tight fit of model-generated to actual historical behavior, builds confidence in the ability of the model to predict the future time-course of the variable(s) of interest.

Having some idea of what is likely to happen in the future is undeniably of importance to policy-makers. And, it is true, as most social science models assume, that the best guess about what will

happen in the near-term future is obtained by looking at what has happened in the recent past. However, there are important methodological and policy-related limitations that derive from using historically-derived correlations to construct a policy-oriented model.

First, there is no guarantee that the future will indeed be like the past. The structural relationships that underlie the historically-estimated correlations evolve over time. Sometimes this evolution occurs quite abruptly, as in the case of OPEC's development, and the consequent virtual instantaneous quadrupling of crude oil prices in 1973. And, even when the evolution is more measured, any change in the underlying structural relationships governing a system's behavior "invalidates" previously-derived correlational relationships. Hence, using a model whose predictive capabilities are predicated on the persistence of historically-derived correlational relationships runs the risk of generating misleading results just when a predictive model is needed most; i.e., when the system is undergoing an alteration in its traditional mode of behaving.

Second, correlation is not causation. As Phelps Brown (1972:6), former President of the Royal Economic Society, notes:

Where, as so often, the fluctuations of different time series respond in common to the pulse of the economy, it is fatally easy to get a good fit, and get it for quite a number of different equations. Nor in any case do I see how any statistical procedure can enable us to distinguish causal from merely contingent relations so as to 'explain' or 'account for' the variable taken as dependent.... For these reasons I conclude that though fortunately some possibilities do exist for testing assumptions about behavior against statistical aggregates, running regressions between time series is only likely to deceive.

To design a policy based on correlation, rather than causation, is to risk attacking a symptom rather than the underlying problem.

Third, to achieve a numerically precise, point-in-time prediction requires a very accurate numerical and structural specification of both the system whose behavior is to be predicted, and the system's external environment. Such a specification, at least for the system's external

environment, is impossible (even in theory!) to achieve. Incorporating enough of the structure of the external environment would render the model unmanageably large. And, because random occurrences can never be fully anticipated, very accurate numerical characterization of the parameters in the external environment is unachievable. Hence, numerically precise, point-in-time prediction is difficult to come by even in principle. What is more, because the external environment is by definition beyond the control of policy-makers within the system, time and effort spent in predicting the time course of external environmental variables is time and effort allocated to behaviors that can not be altered by the system's policy-makers. Such resources are more profitably spent in rearranging structural relationships and parameters within the policy-maker's control, so as to render the system being managed more robust in the face of uncontrollable (and, in principle, unpredictable) environmental perturbations.

Fourth, using a model based upon historically-derived correlational relationships restricts the scope of potential policy alternatives. Historical correlations reflect only the operating range of behavior that the system has exhibited in the recent past. This means that the model can not be validly (in a statistical sense) used to investigate policies that cause the system to operate in as yet historically unobserved regions of its operating range. But then causing a system to shift its locus of operations within its operating range is precisely what an effective policy is designed to do! Policies are aimed at altering particular behaviors that are deemed "undesirable" by some criterion or criteria. To successfully alter behavior, it is necessary to either change the system's underlying structural relationships or cause a shift in the relative dominance of these relationships. Either change will shift the system's behavioral operating point and cause a new set of correlations to emerge. The new behavior can not be accurately estimated by using pre-shift-in-operating-point correlations. Hence, unless model parameters and structural relationships are estimated over the full potential behavioral

operating range of the system in question, the model can not be very useful in examining policies aimed at shifting the system's behavioral operating point.

System Dynamics (Forrester, 1968; Goodman, 1974) was developed in order to overcome the numerous methodological and policy-oriented shortcomings associated with traditional social science modeling approaches. System Dynamics models are not designed to generate numerically-precise, point-in-time predictions. Rather, their purpose is to aid in the design of policies that are effective in mitigating problematic behavior.

A system dynamics model is explicitly causal, rather than correlational, in nature. The development of the causal relationships which go to make up the structure of system dynamics models is guided by, but not determined by, historically-observed relationships. Each causal relationship is estimated over its entire, physically attainable, range. This ensures that the model can be used to explore policy options that are designed to cause the system in question to shift its operating point to a position outside of its historically-observed operating range. How well the model depicts such a shift of course depends upon how well the structural and parametric relationships in the model have been specified. Such specification is a subtle and difficult practice in System Dynamics, relying primarily on the logic and experience of the model builder. Ideally, each of the relationships ultimately is scrutinized by a panel of experts and each palatable alternative is investigated for its impact on policy recommendations. If the nature of the policy recommendations is altered, or the rank-ordering of particular initiatives is changed, by an alteration in structural or parametric relationships, additional effort must be directed at estimating the particular relationship.

Policy analysis, using a system dynamics model, consists of generating a base run which exhibits the particular problematic behavior or behaviors of concern. In the case of this analysis, that behavior is the persistence of an educational attainment gap between upper and lower socioeconomic status children. Once a base run has been established, the

efficacy of all policy interventions is assessed by determining what impact each intervention has on the problematic behavior of interest. Effective policies are those which cause a permanent improvement in the problem behavior being exhibited by the system. Ineffective policies are those which either: improve behavior in the short-term, only to see it worsen again in the longer-run, and/or create new, or exacerbate existing, problem behaviors.

Thus, in performing policy analysis with a system dynamics model, the relevant question is always a relative one: How much has the particular policy intervention improved the problematic behavior relative to the base run? Because all assessments are made in a relative sense, policy analyses with system dynamics models are often conducted with the model initialized in equilibrium, rather than in a disequilibrium mode. When the model is initialized in equilibrium, the sum of the rates of flow into, and out of, each level is equal. As such, there is no change in any of the system levels and hence no change in behavior. Initializing a model in such a state has a major advantage vis-a-vis policy analysis. Doing so enables the response of the system to the policy intervention to be clearly distinguished from any transient response of the system to either initial internal imbalances or any underlying growth forces in the external environment. In the case of the current analysis, this latter category would include such things as changing population, demographic shifts and GNP variations. By "freezing" these external variants, the "pure response" of the system to the policy intervention can be viewed. Subsequently, each of these external influences can be "un-frozen," in turn, so as to reveal its impact on the system's response to the policy intervention.

The equilibrium-testing approach has been adopted for examining policy initiatives designed to reduce the historically-persistent educational attainment gap. For all tests, the system dynamics model developed for the analysis is initialized in an equilibrium condition. In this state, the problematic behavior manifests as a constant gap of 2.31 years in educational attainment between upper and lower socio-economic status

students. All policies investigated are examined in terms of their short- and longer-term impact on the educational attainment gap.

Because of time limitations, it was not possible to exhaustively test the model for robustness and internal consistency. As such, the results of all policy tests should be regarded as preliminary, pending further model testing.

6.2 POLICY TESTS: SCHOLASTIC ACHIEVEMENT AND JOB SKILLS

The policy tests discussed below fall into two major categories of policy simulations: (a) efforts to improve scholastic achievement levels of disadvantaged students through compensatory education, and (b) efforts to improve job relevant skills of school terminators so as to increase their employability. Policy Tests Nos. 1 through 3 produce the first category of policy simulations. Policy Tests Nos. 4 and 5 produce the second category of policy simulations.

Briefly, the results of these tests show the model to be capable of simulating expected effects of policy interventions under absolute conditions which assume that policies will be ideally successful, e.g., that ESEA Title I will increase significantly student achievement or that CETA will make disadvantaged school terminators more employable. Policies aimed at improving achievement in the model runs (Nos. 1, 2, 3) do initially boost LES achievement, reduce terminations and narrow to a degree the attainment gap, but eventually counter-pressures reduce achievement, increase terminations and restore the gap. The job training policies (CETA) have the expected effects of employing more LES,* and keeping more UES secondary students in this system (Youth Employment Service), but neither affects the attainment gap in the long term. In short, model dynamics serve to defeat policy initiatives and in each disturbance of equilibrium, the model begins to readjust toward equilibrium. As expected, the only way to permanently close the gap is to cut the feedback loop which reallocates aid to the upper group whenever the gap is narrowed (see Test No. 3).

*LES designates lower socioeconomic students. UES designates upper socioeconomic students.

6.2.1 Boosting Achievement

Policy Test No. 1: Increase LES Achievement Level. This policy test simulates the intended effects of ESEA Title I--i.e., increase scholastic achievement of low socio-economic children. Policy Test No. 1 does not affect parent expectation (although that would be an objective of Head Start). The combined effects of increasing achievement and parent expectation are shown in Policy Test No. 2, below.

As shown in Figure 6A,* a pulsed increase of approximately 15% in LES achievement in 1985 results in achievement falling back and settling at equilibrium in about 30 years. The educational attainment gap index declines from 1.0 to approximately .91 and then rises, overshooting initial equilibrium. The resource gap index rises and then begins to fall back below initial equilibrium. Dynamically in the model, as the educational attainment gap narrows, educational resources begin to be re-allocated, increasing the fraction going to lower SES students. But the rate of increase going to the upper group exceeds the rate of decline in the attainment gap (see Figure 6A). This behavior is analogous to production-inventory models in which a decrease in inventory results in a faster increase in production to replace depleted inventory. We would argue that such a condition is evident in HEA funding in the 1970's--resources for students rose at a rate exceeding optimal allocations (given labor markets for college graduates) in some respects to restore the opportunities provided the poor by federal initiatives in the 1960's.

When resource reallocation has arrested the decline of the education gap index in 1995, but more resources are still going to the upper group, the resource allocation index begins to fall, and the education attainment gap index rises, reaching equilibrium in the year 2005. However, at the point when the education attainment gap reaches initial

*Note in Figure 6A, and in other figures in Section 6, where two or more variables have values which would be plotted at the same point in the graph, the computer prints one symbol at that point and indicates the set of variables (included at that point) to the right of the printout on the same line of the graph.

ALS=L, AUS=U, RGI=R, IEAG=G



CERPOL1: PCALT=1985

Figure 6A

Pulsed Increase in LES Achievement Level

- L = ALS Achievement of Lower Socioeconomic Status Students
- U = AUS Achievement of Upper Socioeconomic Status Students
- R = RGI Resource Gap Index
- G = IEAG Educational Attainment Gap Index

equilibrium, the resource gap index is still above equilibrium, therefore the gap continues to narrow. The continued narrowing or "overshoot" stops when the resource gap index falls below initial equilibrium about 2020. If the model run were to continue, we would expect further damping and eventually a reequilibrium of both indexes.

A dynamic explanation and causal loop diagram are presented below in Section 6.2.3 following the discussion of the effects of Policy Test No. 2:

Policy Test No. 2: Increase LES Achievement and Parent Expectation. This policy test simulates the combined intended effects of ESEA Title I, Head Start and Follow Through: raising scholastic achievement of low socio-economic children through compensatory education and maintaining achievement gains through parent involvement.

As shown in Figure 6B, a pulsed increase in LES achievement and parent expectation in 1985 results in achievement gradually declining to the end of this model run but not back to equilibrium as in Policy Test No. 1. By pushing up parent expectations achievement settles gradually to a higher level, simulating what one would expect from the combined effects of successfully stimulating achievement and raising parents' expectations as to amounts of schooling their offspring should complete.

However, as in Policy Test No. 1, the education attainment gap index declines, the resource gap index goes up as funds are being taken away from lower SES students and reallocated to upper SES students. The gap narrows further than in Policy Test No. 1, and takes longer to re-equilibrate, but the pattern is the same.

6.2.2 Dynamic Explanation

As shown below in Figure 6C, pulsing achievement and parent expectation produces the following causal sequence:

- (1) As LES achievement exceeds standards, the fraction of LES terminations at the secondary level falls, thus causing the attainment gap to narrow.



CERPOL2: PCALT=1985 TACLPE=1985

Figure 6B

Pulsed Increase in β Achievement and LES Parental Expectation Factor

L = ALS Achievement of Lower Socioeconomic Status Students
U = AUS Achievement of Upper Socioeconomic Status Students
R = RGI Resource Gap Index
G = IEAG Educational Attainment Gap Index

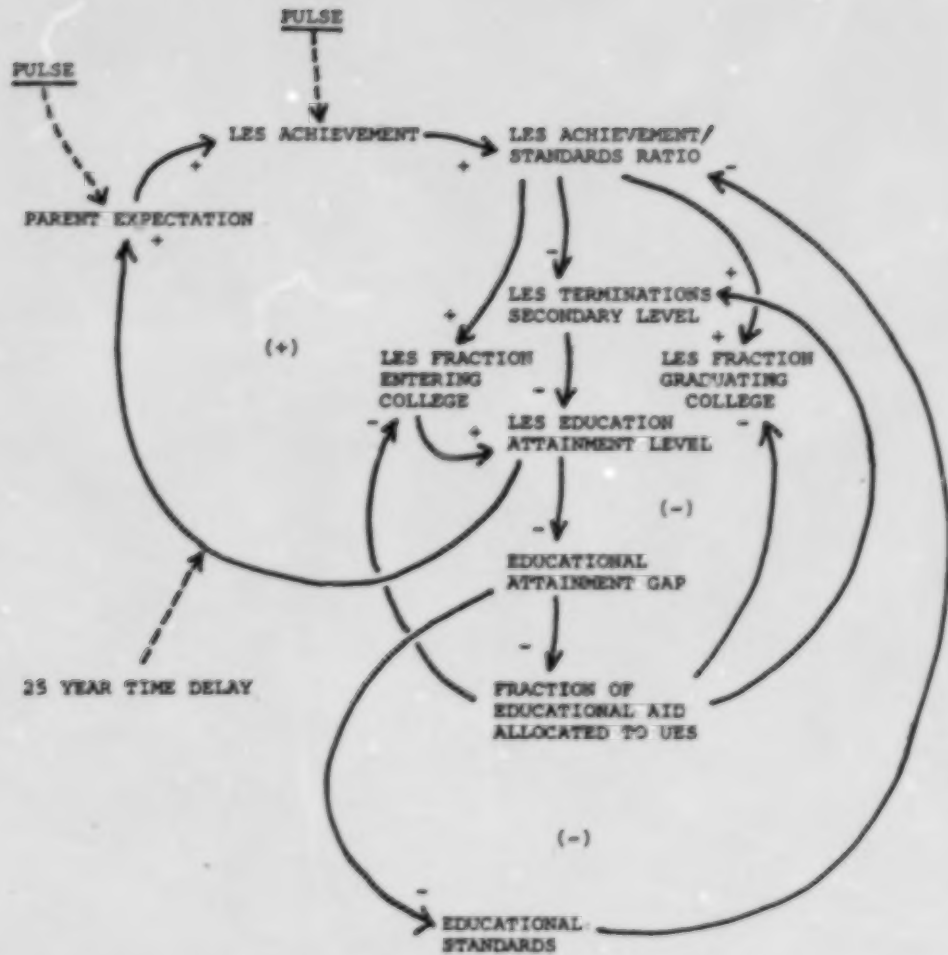


Figure 6C

Dynamic Restoring the Attainment Gap Following Pulsed Increases in LES Achievement and Parent Expectation

- (ii) As the attainment gap narrows, educational resources are allocated away from LES students and toward UES students (as shown in the model run--Figure 6D--the fraction of aid allocated to upper SES students rises from 85% to 96%, reducing the fraction of LES entering college by about -18% by the end of the run; see Figure 6E for fraction of LES entering college).
- (iii) The direct effect of aid causes terminations to rise even when achievement of LES students is higher than initial equilibrium level.
- (iv) As the education attainment gap narrows, standards rise; when standards exceed LES achievement, terminations due to standards begin to rise (as shown in the model run--Figure 6F--the negative effect of standards for fraction of LES students entering college begins in the model run at 1986 and gradually diminishes after 2018).

Policy Test No. 3: Increase in UES Achievement and Parent Expectation While Preventing Reallocation of Educational Resources to UES. This policy run tests the fundamental argument in this study; namely, that opportunities of LES students are offset by more opportunities for UES students through reallocation of public resources in response to perceived erosions of relative advantage (as manifest in narrowing the attainment gap). Model dynamics reproduce a counter-response: Whenever LES students gain ground educationally on UES students, compensating forces are activated. The strongest of these forces is money. The model allows aid to education to more strongly affect LES than UES students, thus a reallocation from LES to UES affects the upper group only slightly but the lower group substantially, and negatively. This dynamic (shown above in Figure 6C) produces a very powerful statement about the attainment gap: the gap is maintained primarily by a reallocation of public monies, which occurs

FAEAUS=X, TUS=U, TLS=L, AEUS=\$



CERPOL3: PCALT=1985 TACLPE=1985

Figure 6D

Pulsed Increase in LES Achievement and LES Parental Expectation Factor

- X = FAEAUS Fraction of Aid-to-Education Allocated to Upper Socioeconomic Status Students
- U = TUS Total Upper Socioeconomic Status Students
- L = TLS Total Lower Socioeconomic Status Students
- \$ = AEUS Aid-to-Education for Upper Socioeconomic Status Students

UEA=U, LEA=L, UCG=C, FLTS=1, FLGCV=2, FLECY=3

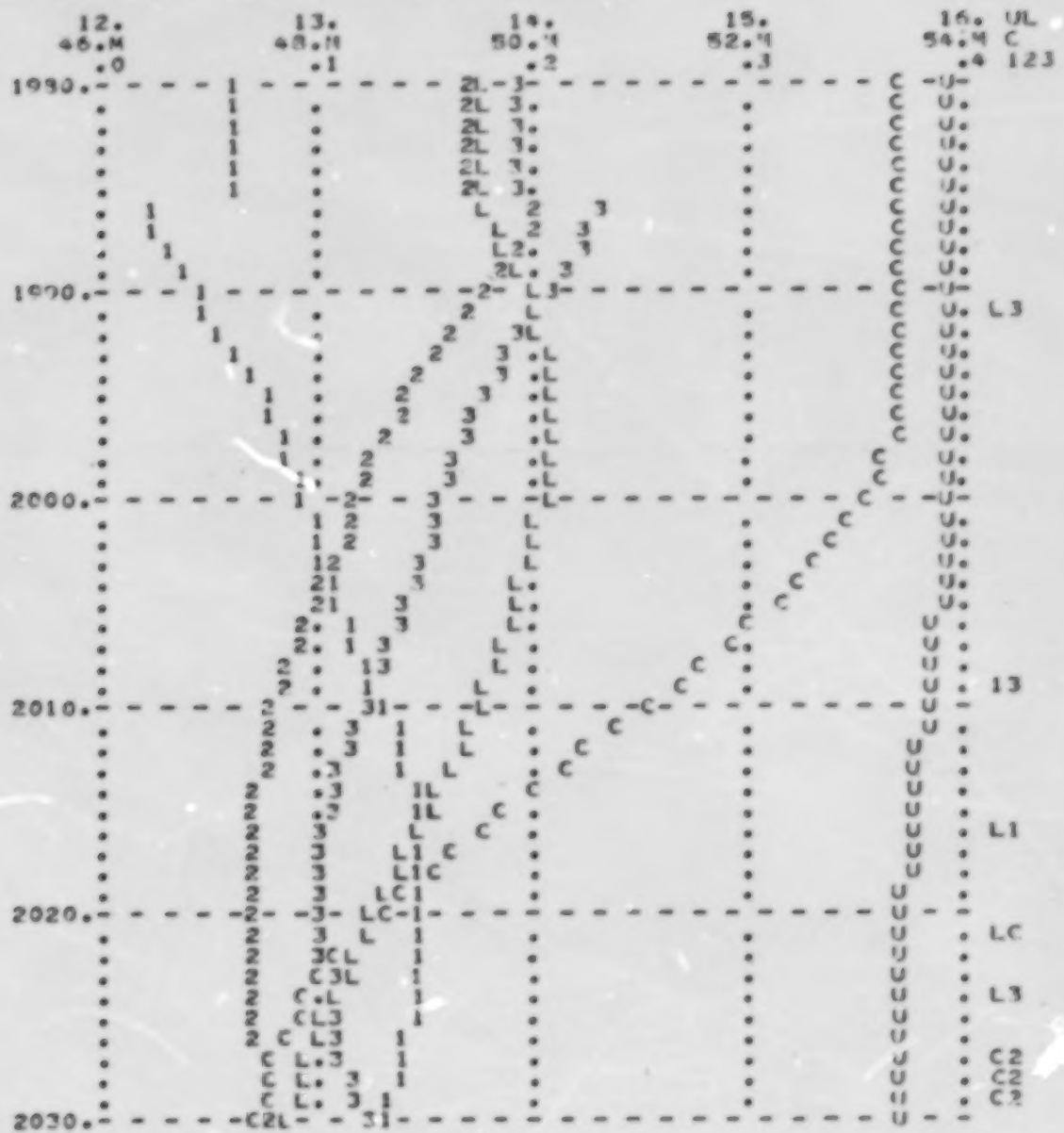


Figure 6E

Pulsed Increase in LES Achievement and LES Parental Expectation Factor

- U = UEA Upper Socioeconomic Status Educational Attainment
- L = LEA Lower Socioeconomic Status Educational Attainment
- C = UCG Upper Socioeconomic Status College Graduates
- 1 = FLTS Fraction of Lower Socioeconomic Status Terminating at Secondary Level
- 2 = FLGCV Fraction of Lower Socioeconomic Status Graduating College
- 3 = FLECY Fraction of Lower Socioeconomic Status Entering College



Figure 6F

Pulsed Increase in LES Achievement and LES Parental Expectation Factor

- | | |
|-----------|--|
| 1 = PJLEC | Percent from Jobs on Lower Socioeconomic Status Entering College |
| 2 = PALEC | Percent from Aid-to-Education on Lower Socioeconomic Status Entering College |
| 3 = ESLEC | Effect of Standards on Lower Socioeconomic Status Entering College |
| 4 = ECC | Effect of College Capacity |
| 5 = EACEC | Effect of Age Considerations on Entry Into College |

whenever and wherever there is perceived a loss of relative advantage on the part of UES, or a perceived loss on the part of LES. As in the case of ESEA Title I and HEA Title IV funding shown in Section 4.0, "The Process," programs may be initiated by government to provide more opportunity for the poor, but (a) are not funded (for long) at levels that could actually close the attainment gap and (b) are offset by expansion of funds that benefit groups better off than the poor.

In Policy Test No. 3, as the gap narrows, the feedback loop which would otherwise reallocate aid away from LES and toward UES is neutralized (Figure 6G). Thus, the resource gap index remains constant, the effect of aid on LES terminations is unchanged (Figure 6H), and a "job vacuum" effect starts to build (Figure 6H), but the only significant negative feedback loop that could reequilibrate the attainment gap is standards. Because both achievement and parent expectation are pushed up, LES achievement does not sink back to initial equilibrium and thus standards do not cause terminations. The net effect is a continuous reduction of the attainment gap to the end of the model run.

6.2.3 Job Skills

Policy Test No. 4: Increase Employability of LES Secondary and College Terminators Through Job Skill Programs. This policy test simulates the intended effects of CETA, i.e., increase relevant job skills so as to make terminators more immediately employable. In the model run, time to absorb LES secondary and college terminators is decreased to simulate the effects of a successful policy. The net effect of this policy (as seen in Figure 6I) is to widen the gap and drive up the educational resource gap index. A dynamic explanation follows (Figure 6K).

- (1) increasing employability of secondary and college terminators initially increases the percentage terminating to take jobs - thus, widening the gap (Figure 6J).

CERPOL7: PCALT=1985 TACLPE=1985 PFCT=1985 TFCAEU=0/0/0/0/0/0/0/0/0/0

IEAG=G, RGI=R

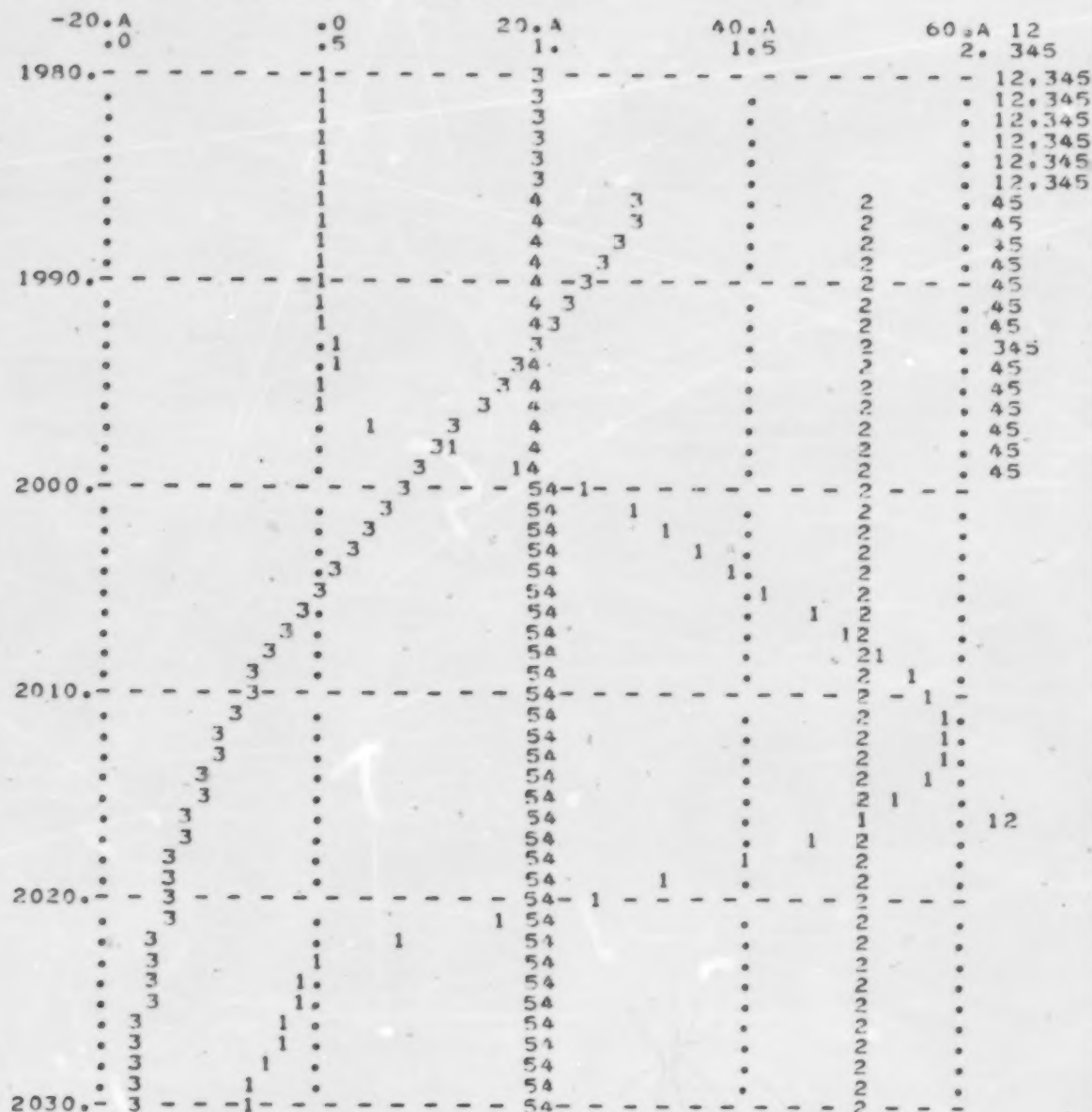


Figure 6G

Pulsed Increase in LES Achievement and LES Parent Expectation Factor, While Neutralizing Resource Allocation to UES

G = IEAG Educational Attainment Gap Index
R = RGI Educational Resource Gap Index

PJLEC=1, PAELEC=2, ESLEC=3, ECC=4, EACEC=5



CEPPOL6: PCALT=1985 TACLPE=1985 PFCT=1985 TFCAEU=0/0/0/0/0/0/0/0/0/0

Figure 6H

Pulsed Increase in LES Achievement and LES Parent Expectation Factor, While Neutralizing Resource Allocation to UES

- 1 = PJLEC Percent from Jobs on Lower Socioeconomic Status Entering College
- 2 = PAELEC Percent from Aid-to-Education on Lower Socioeconomic Status Entering College
- 3 = ESLEC Effect of Standards on Lower Socioeconomic Status Entering College
- 4 = ECC Effect of College Capacity
- 5 = EACEC Effect of Age Considerations on Entry Into College

CERPCL8: TIERAT=1985

IEAG= RGI=R

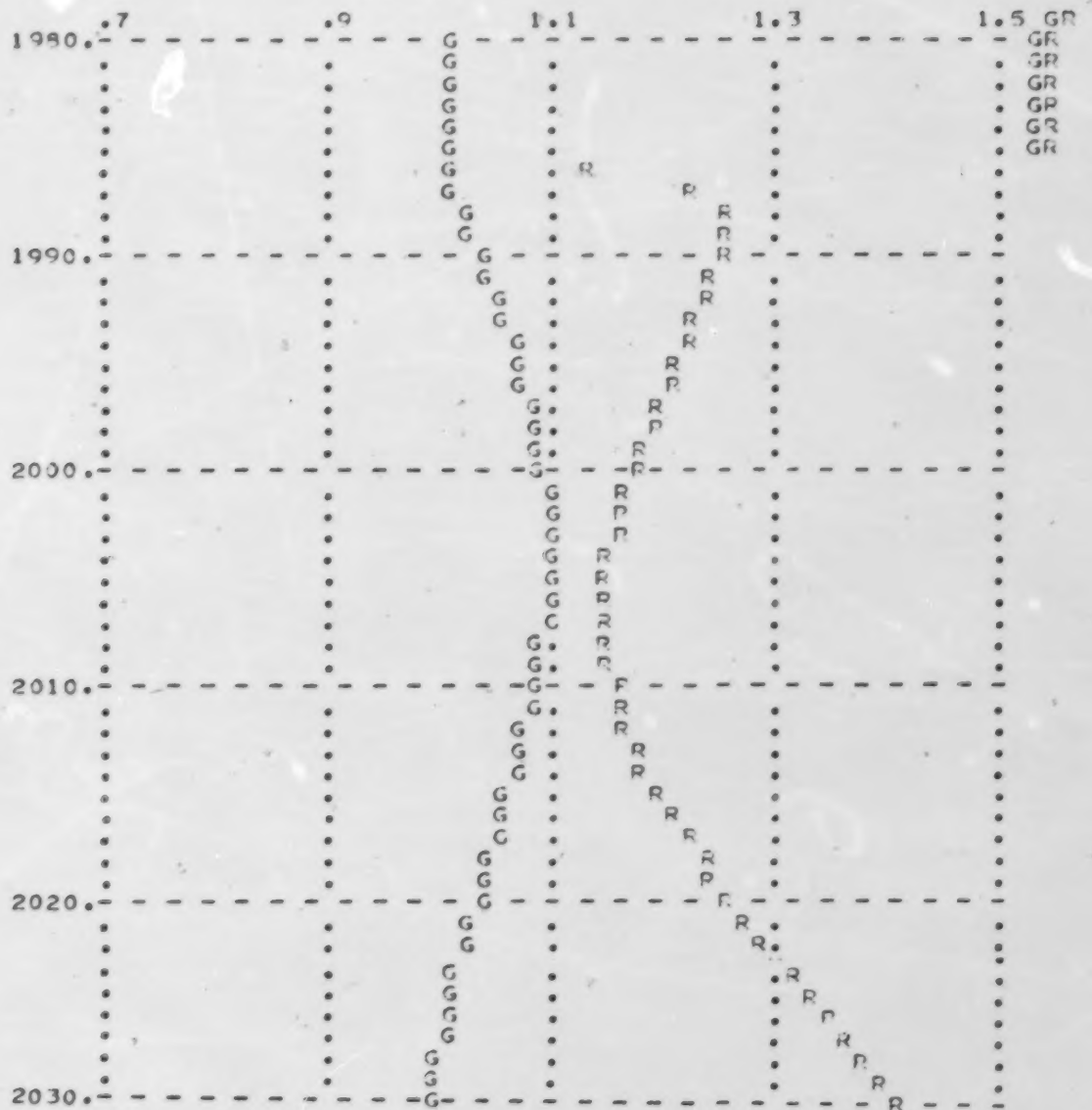


Figure 6I

Pulsed Decrease in Time to Absorb LES Secondary and College Terminators into Jobs

G = IEAG Educational Attainment Gap Index
R = RGI Educational Resource Gap Index

PJLEC=1, PAELEC=2, ESLEC=3, ECC=4, EACEC=5

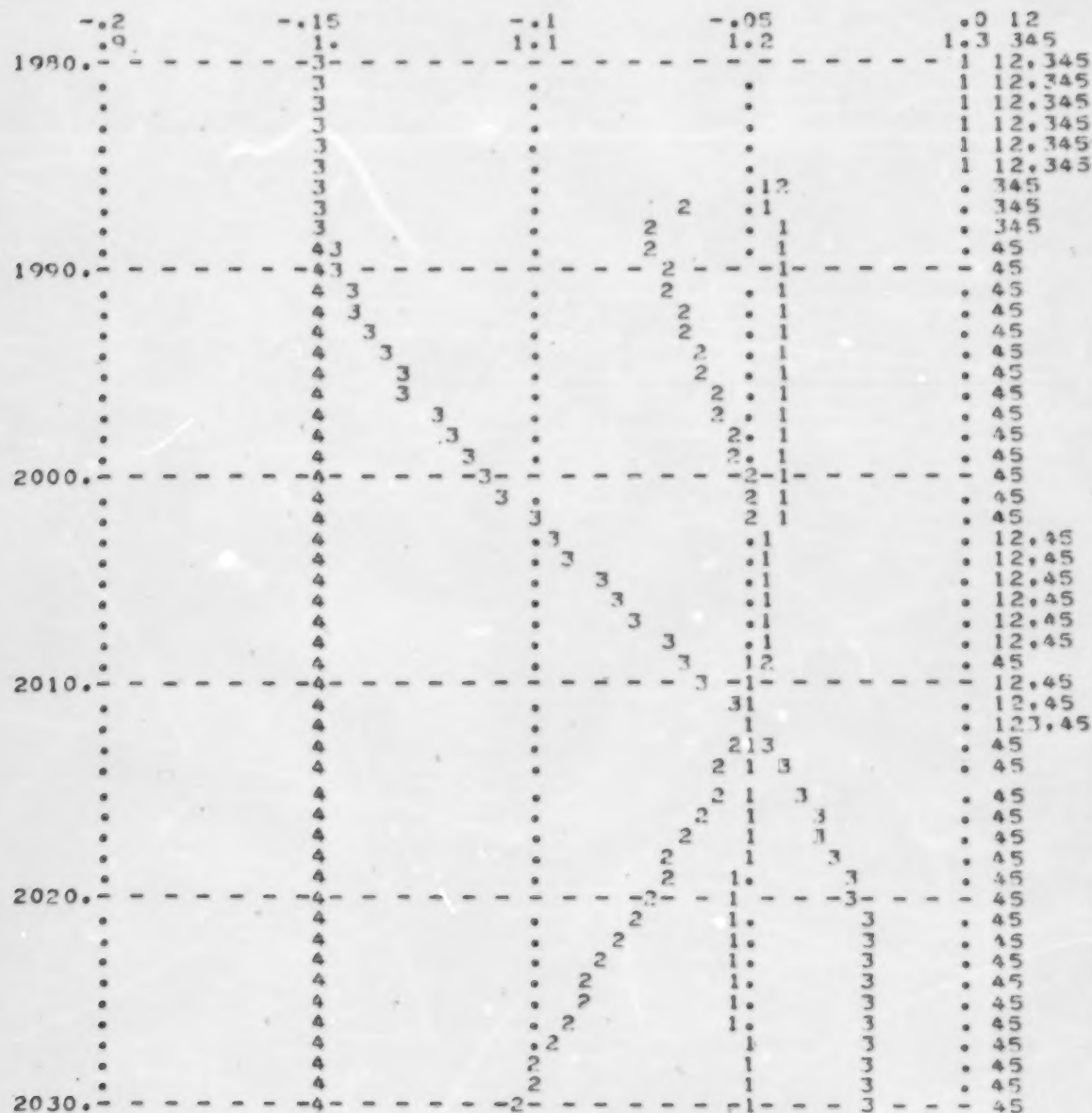


Figure 6J

Pulsed Decrease in Time to Absorb LES Secondary and College Terminators into Jobs

- 1 = PJLEC Percent from Jobs on Lower Socioeconomic Status Entering College
- 2 = PAELEC Percent from Aid-to-Education on Lower Socioeconomic Status Entering College
- 3 = ESLEC Effect of Standards on Lower Socioeconomic Status Entering College
- 4 = ECC Effect of College Capacity
- 5 = EACEC Effect of Age Considerations on Entry Into College

- (iii) as fewer LES terminators are unemployed (due to the policy), compared to UES terminators (not affected by the policy), the relative change produces a reallocation favoring UES, i.e., whenever the ratio of unemployed UES/LES shifts, the group with the higher relative unemployment receives a larger fraction of the existing resources (Figure 6K).
- (iii) in this policy run, the effect of the unemployment ratio is to override the normal tendency of the system to shift funds to the lower group as the gap widens (Figure 6L).
- (iv) as the ratio of UES/LES unemployment rises, UES college entrances and graduations increase (aided additionally by a larger fraction of educational resources).

The net effect of this policy is to place the poor in double jeopardy as regards the educational attainment gap. The gap widens and more resources are transferred to the advantaged.

Policy Test No. 5: School Incentives Through Jobs. This policy test simulates the intended effects of the Youth Employment Service and its predecessor, Job Corps: Jobs and income as incentive to stay in school. This policy is simulated by boosting the fraction of LES secondary students who stay in school and enter college.

As shown in Figure 6M, a pulsed increase in school retention produces initially a decrease in the attainment gap and an increase in the resource gap index--much the same pattern observed in Policy Test Nos. 1 and 2. The following dynamics are observed:

- (i) as the gap narrows, educational resources begin to be reallocated away from LES and to UES causing the gap to begin widening again (Figure 6N).
- (ii) standards are raised as the gap narrows, producing a counter-pressure on LES retention (Figure 6N).

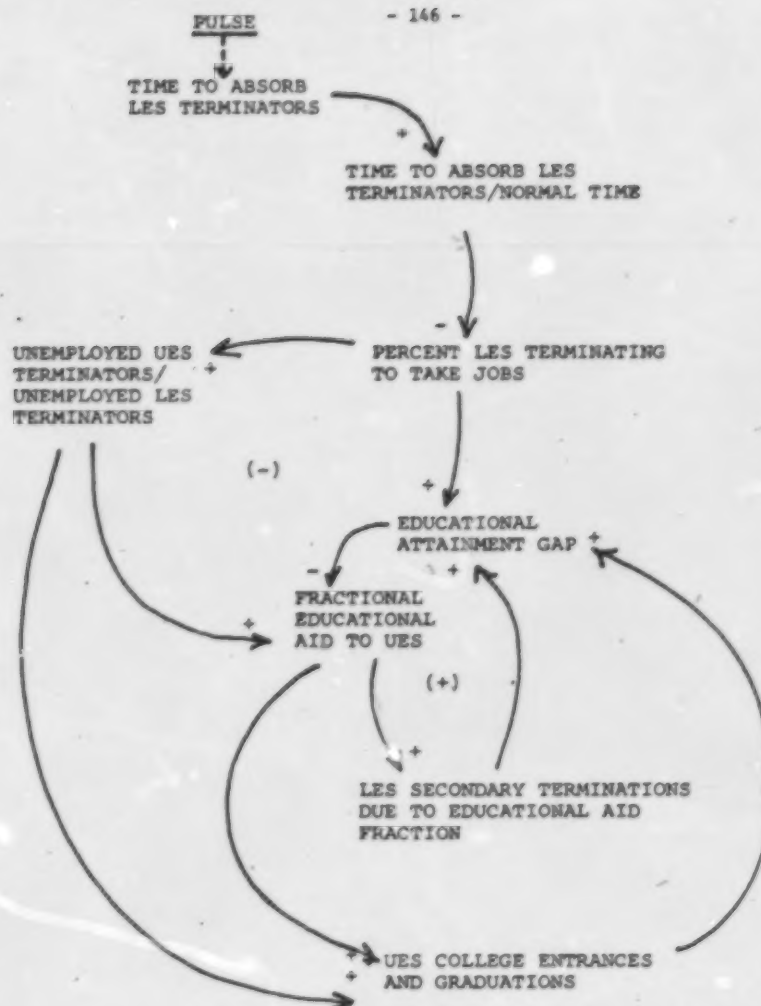


Figure 6K

Dynamic Producing Simultaneously a Widening Attainment Gap and Increasing Education Aid to UES

UEA=U, LEA=L, UCG=C, FLTS=1, FLGCY=2, FLECY=3



Figure 6L

Pulsed Decrease in Time to Absorb LES Secondary and College Terminators into Jobs

U = UEA	Upper Socioeconomic Status Educational Attainment
L = LEA	Lower Socioeconomic Status Educational Attainment
C = UCG	Upper Socioeconomic Status College Graduates
1 = FLTS	Fraction of Lower Socioeconomic Status Terminating at Secondary Level
2 = FLGCY	Fraction of Lower Socioeconomic Status Graduating College
3 = FLECY	Fraction of Lower Socioeconomic Status Entering College

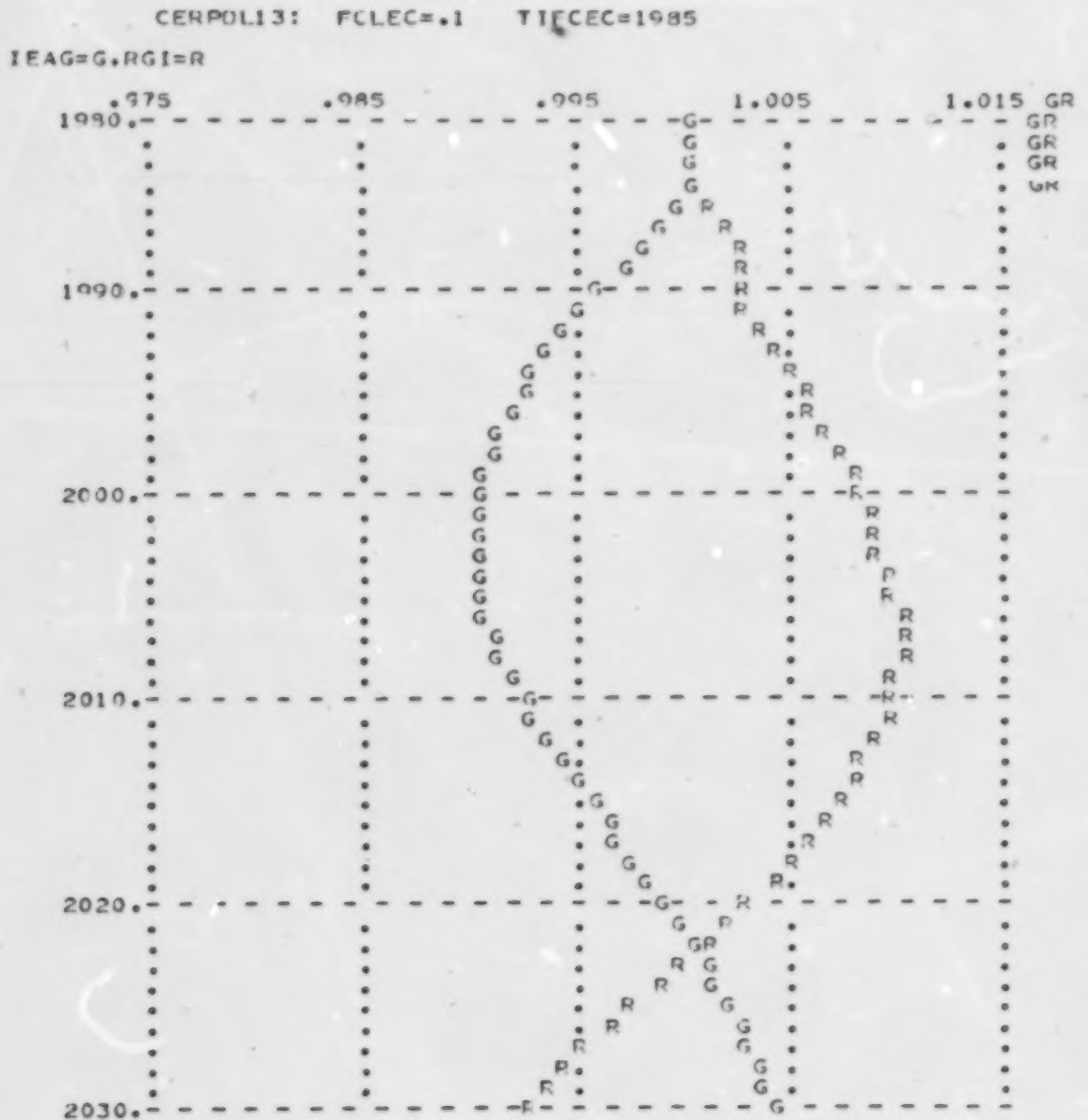


Figure 6M

Pulsed Increase in Fraction of LES Entering College

G = IEAG Educational Attainment Gap Index
R = RGI Resource Gap Index

[illegible]

Pulsed Increase in Fraction of LES Entering College

- | | |
|------------|---|
| 1 = PJLEC | Percent from Jobs on Lower Socioeconomic Status
Entering College |
| 2 = PAELEC | Percent from Aid-to-Education on Lower Socioeconomic
Status Entering College |
| 3 = ESLEC | Effect of Standards on Lower Socioeconomic Status
Entering College |
| 4 = ECC | Effect of College Capacity |
| 5 = EACEC | Effect of Age Considerations on Entry Into College |

- (iii) removing more potential full-time LES employees from the labor market produces a counter-pressure from job pull (Figure 6N).

The net effect of job incentive policies is to temporarily close the gap, followed by restoration and overshoot.

6.3 CONCLUSIONS

Observed in some of these runs is a tendency toward long-term deterioration of achievement and attainment not only for lower SES students but also for upper SES students. The model in equilibrium is a zero-sum game. If policies enable more lower SES students to progress to higher and more expensive levels of the school system, there is simply not enough money to go around. Given reallocation to UES, which is the system's automatic response to LES gains, there is even less money from the existing pot for the disadvantaged.

The tendency of the system to settle at states showing deterioration of UES positions, in an absolute sense, but not in a relative sense, reveals a system response to perturbation which seems to say: the primary function of the system is to maintain a constant gap separating the two social classes through control of resources. Due to pressures from job pull, the model is satisfied to allow UES positions to fall below initial values as long as LES positions are relatively lower and not threatening UES relative advantage. In a growth model where more or less educational resources become available due to economic conditions, where unemployment, absorption rate and jobs are affected by labor market changes, and where demographics affect capacity and per capita resources, we would expect somewhat different behavior from the model. (Testing of the model in growth mode awaits further research.)

We conclude from our work to date that the ability of the upper class to control resources and to use those resources to control social class access to upper levels of the school system is sufficient to thwart

even ideally effective educational policies which do not restrict the upper class advantage in the contest for educational resources.

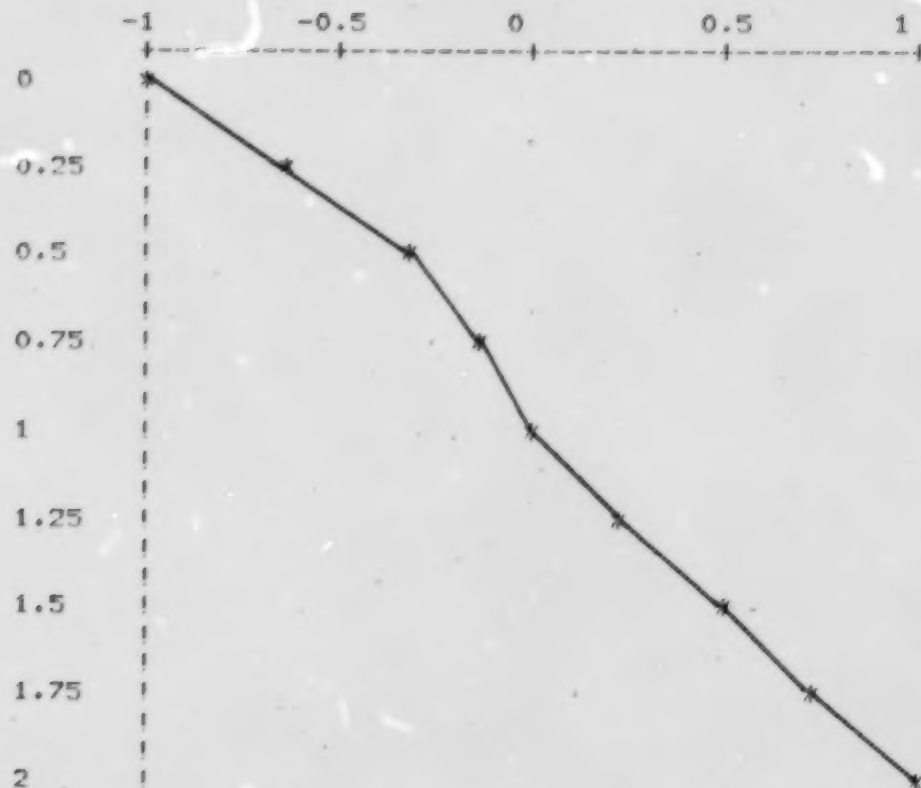
APPENDICES

APPENDIX I

FIGURES 5H THROUGH 5BB AS CITED IN SECTION 5
"A MODEL OF THE CONTEST FOR EDUCATIONAL RESOURCES"

EUAF.K VS RUR.K

EUAF.K



EUAF.K=TABHL (TEUAF,RUR.K,0,2,.25)
TEUAF=-1/-.6/-.3/-.1/0/.25/.5/.75/1

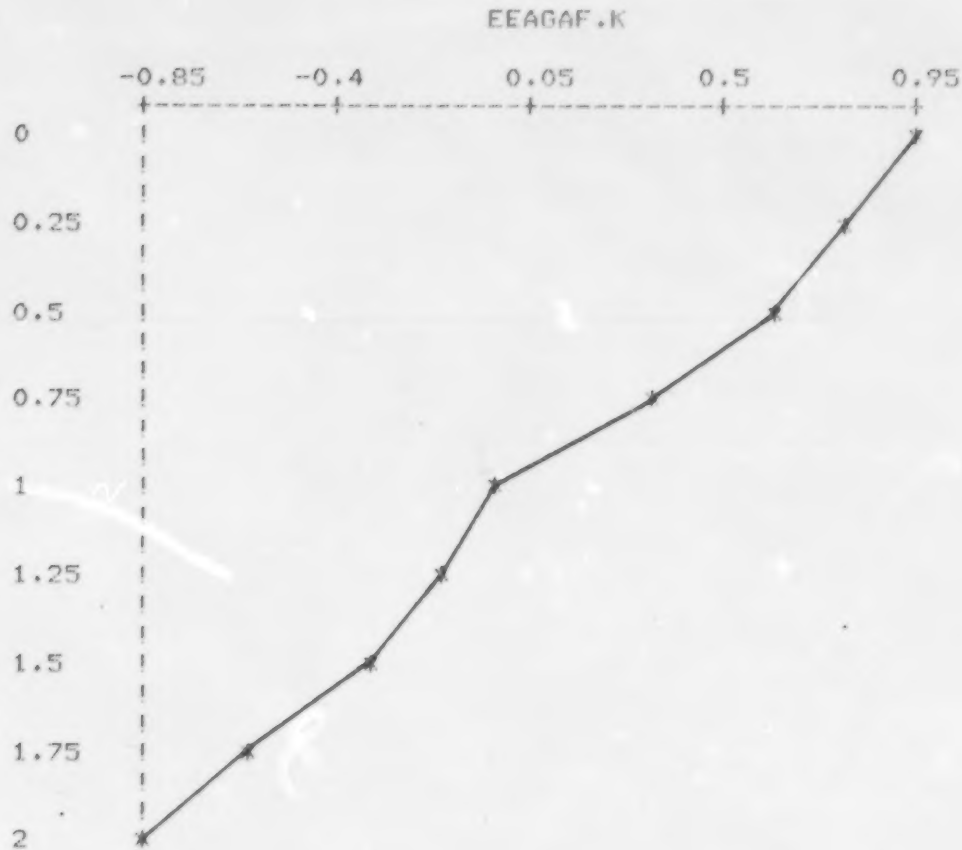
Figure 5H

Table Showing Bi-variate Relationship Between Unemployment Ratio for Upper and Lower Socioeconomic Status Terminators, and Aid-to-Education

EUAF = Effect of Unemployment on Upper Fraction of Aid-to-Education

RUR = Ratio of Unemployed Upper SES Terminators to Unemployed Lower SES Terminators

EEAGAF.K VS PEAG.K/NEAG



EEAGAF.K=TABLE(TEAGAF,PEAG.K/NEAG,0,2,.25)
TEAGAF=.95/.8/.65/.35/0/-.15/-.3/-.6/-.85

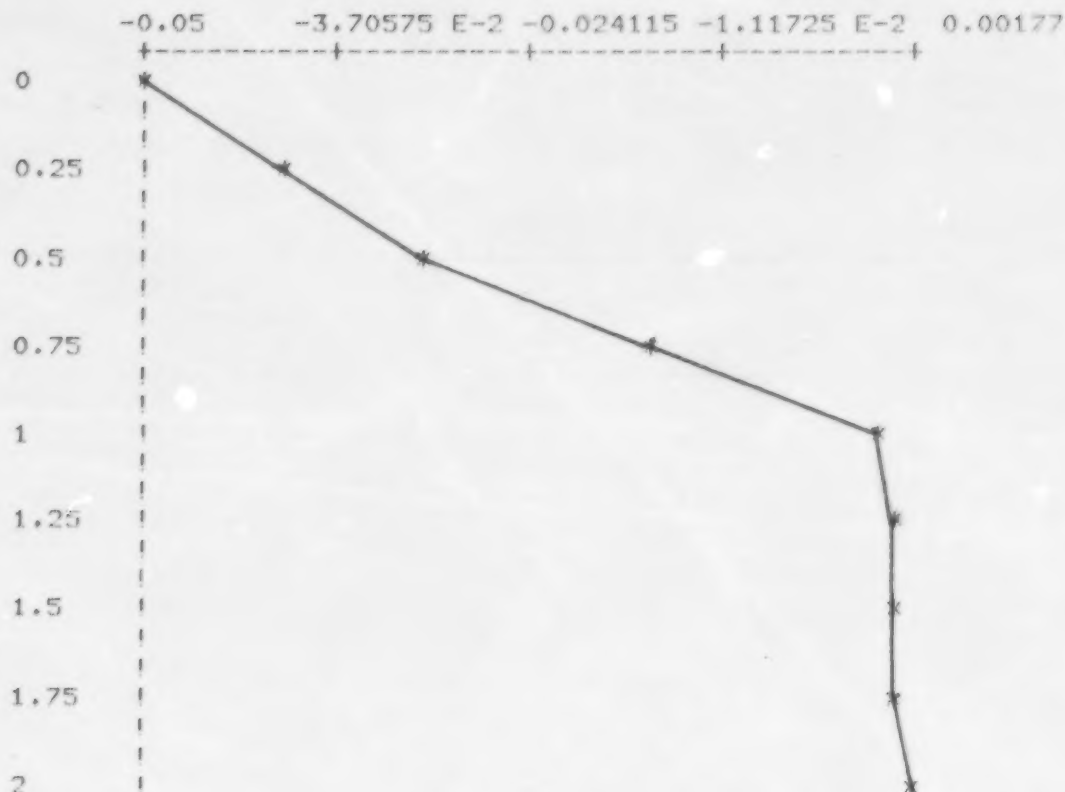
Figure 51

Table Showing Bi-variate Relationship Between Perceived Changes in the Educational Attainment Gap and Aid-to-Education

EEAGAG = Effect of Educational Attainment Gap on Allocation Fraction
PEAG = Perceived Educational Attainment Gap
NPEAG = Normal Perceived Educational Attainment Gap

PAEUES.K VS AEPUS.K/IAEPUS

PAEUES.K



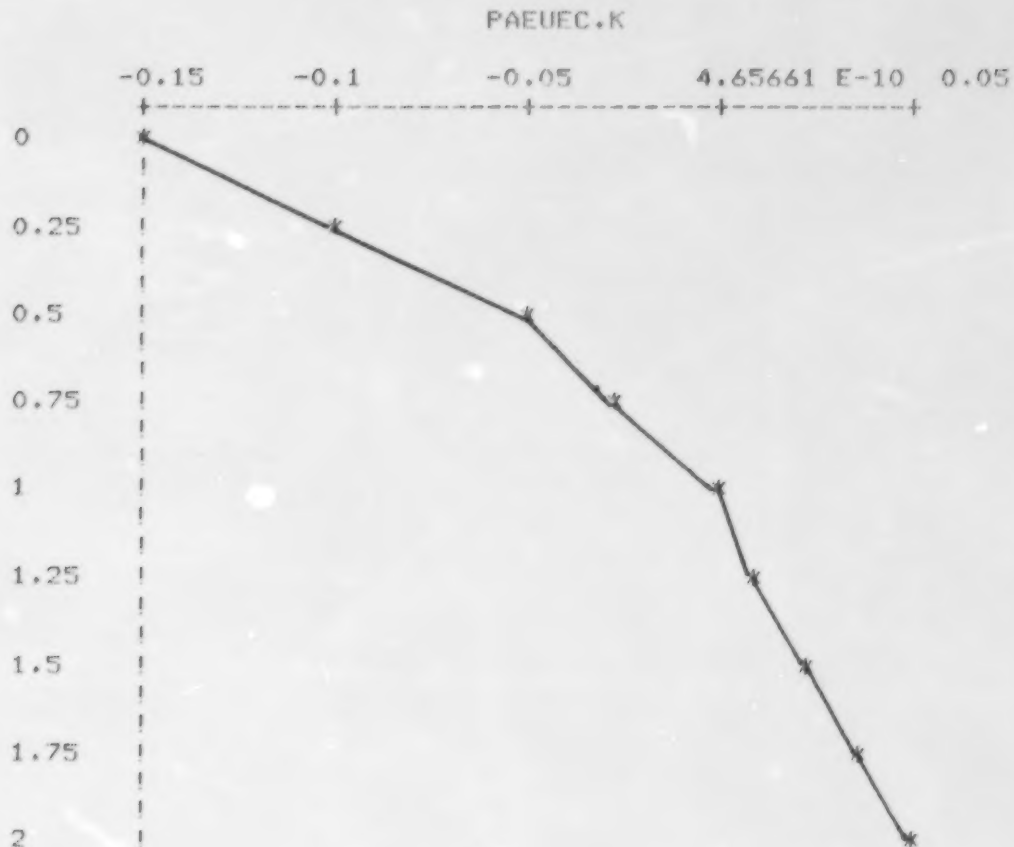
PAEUES.K=TABHL(TPAEUS,AEPUS.K/IAEPUS,0,2,.25)
 TPAEUS=-.05/-.04/-.03/-.015/0/.001/.0015/.00175/
 .00177

Figure 5J

Table Showing Bi-variate Relationship Between Changes in
 Aid-to-Education and Terminations Prior to Entering Secondary
 School for Upper Socioeconomic Status Students

PAEUES = Percent from Aid-to-Education on Upper Socioeconomic
 Status Students Entering Secondary School
 AEPUS = Aid-to-Education Per Upper Socioeconomic Status Student
 IAEPUS = Initial Aid-to-Education Per Upper Socioeconomic Status
 Student

PAEUEC.K VS AEPUS.K/IAEPUS

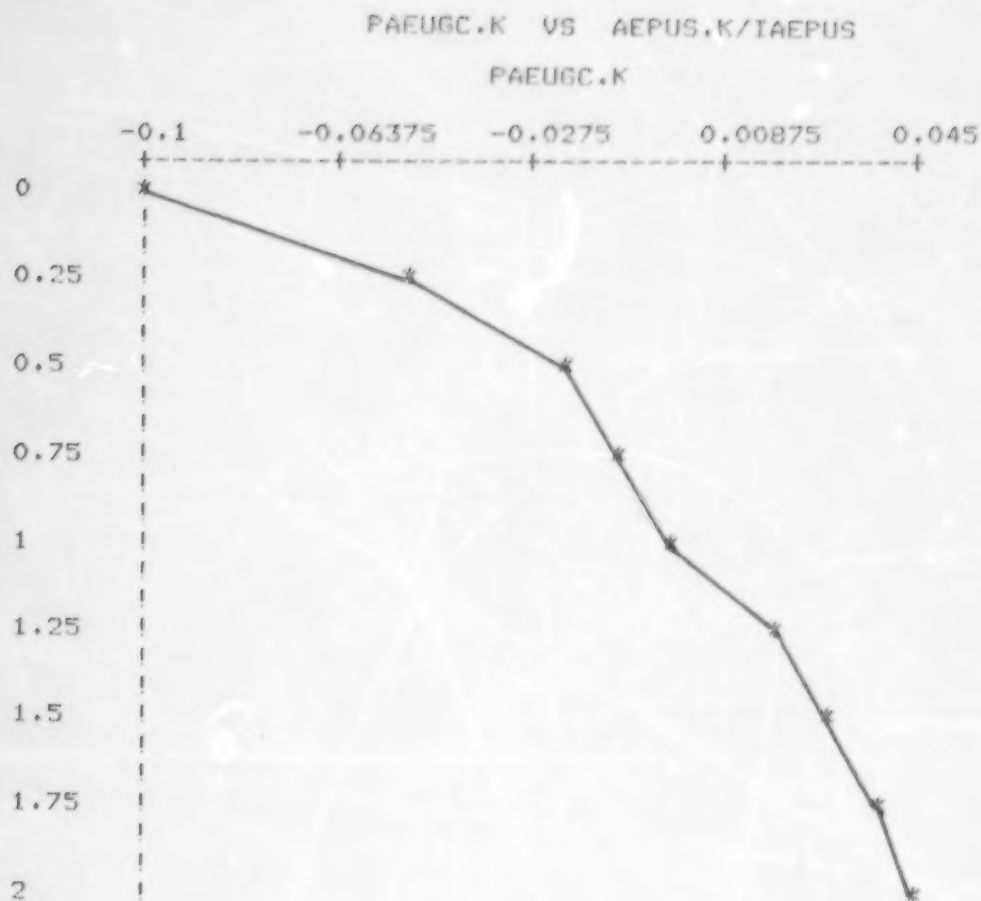


PAEUEC.K=TABLE(TPAEUC,AEPUS.K/IAEPUS,0,2,.25)
 TPAEUC=-.15/-.1/-.05/-.025/0/.01/.025/.04/.05

Figure 5K

Table Showing Relationship Between Changes in Aid-to-Education and Terminations Prior to Entering College for Upper Socio-economic Status Students

PAEUEC = Percent from Aid-to-Education on Upper Socioeconomic Status Students Entering College
 AEPUS = Aid-to-Education Per Upper Socioeconomic Status Student
 IAEPUS = Initial Aid-to-Education Per Upper Socioeconomic Status Student



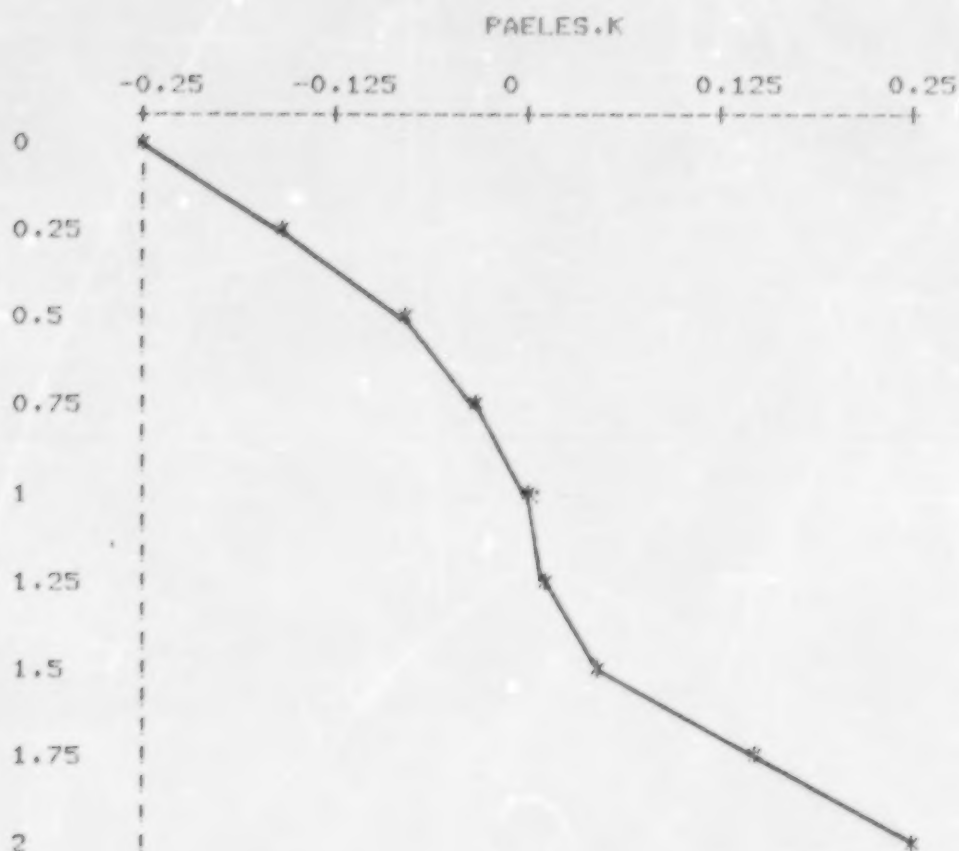
PAEUGC.K=TABLE(TPAEUG,AEPUS.K/IAEPUS,0,2,.25)
 TPAEUG=-.1/-.05/-.02/-.01/0/.02/.03/.04/.045

Figure 5L

Table Showing Relationship Between Changes in Aid-to-Education and Terminations Prior to College Graduation for Upper Socio-economic Status Students

PAEUGC = Percent from Aid-to-Education on Upper Socioeconomic Status Students Graduating from College
 AEPUS = Aid-to-Education Per Upper Socioeconomic Status Student
 IAEPUS = Initial Aid-to-Education Per Upper Socioeconomic Status Student

PAELES.K VS AEPLS.K/IAEPLS



PAELES.K=TABHL(TPAELS,AEPLS.K/IAEPLS,0,2,.25)
 TPAELS=-.25/-.15/-.075/-.03/0/.02/.05/.15/.25

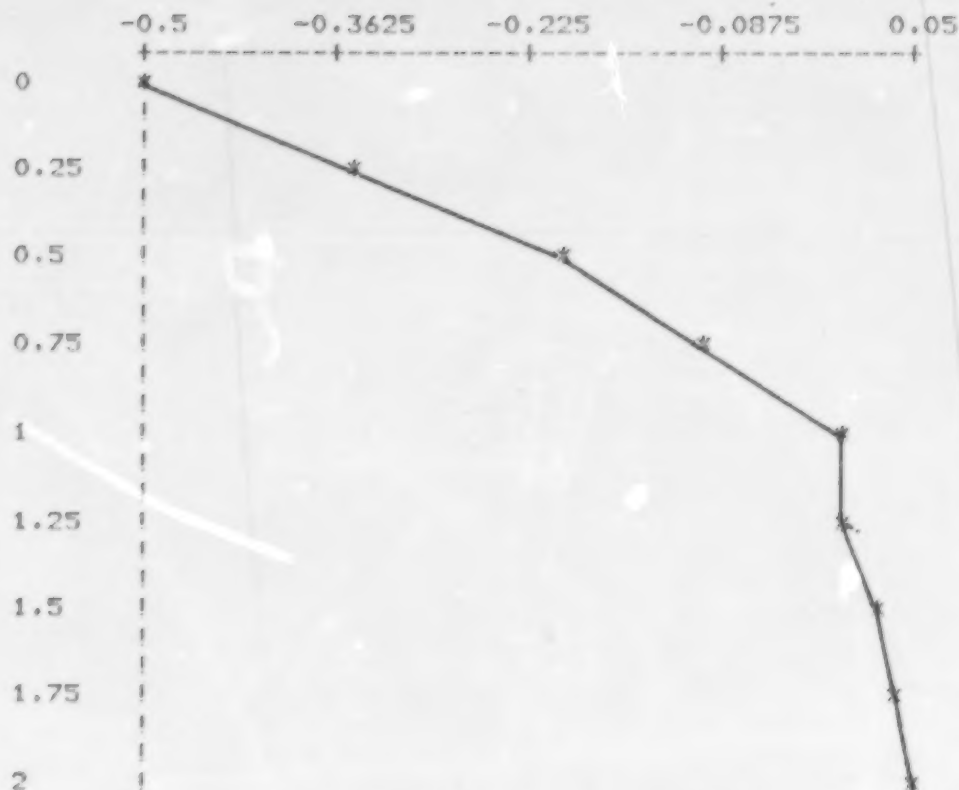
Figure 5M

Table Showing Bi-variate Relationship Between Aid-to-Education and Terminations Prior to Entering Secondary School for Lower Socioeconomic Status Students

PAELES = Percent from Aid-to-Education on Lower Socioeconomic Status Students Entering Secondary School
 AEPLS = Aid-to-Education Per Lower Socioeconomic Status Student
 IAEPLS = Initial Aid-to-Education Per Lower Socioeconomic Status Student

PAELEC.K VS AEPLS.K/IAEPLS

PAELEC.K



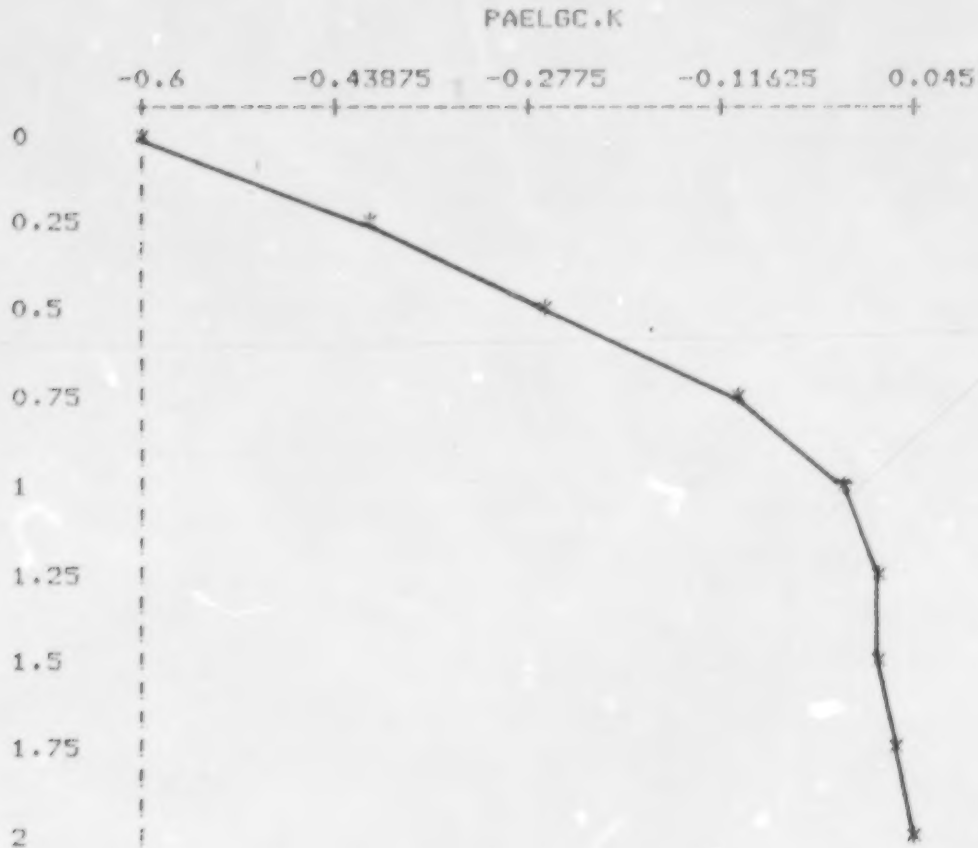
PAELEC.K=TABHL(TPAELC,AEPLS.K/IAEPLS,0,2,.25)
TPAELC=-.5/-.35/-.2/-.1/0/.01/.025/.04/.05

Figure 5N

Table Showing Bi-variate Relationship Between Aid-to-Education and Terminations Prior to Entering College for Lower Socioeconomic Status Students

PAELEC = Percent from Aid-to-Education on Lower Socioeconomic Status Students Entering College
AEPLS = Aid-to-Education Per Lower Socioeconomic Status Student
IAEPLS = Initial Aid-to-Education Per Lower Socioeconomic Status Student

PAELGC.K VS AEPLS.K/IAEPLS



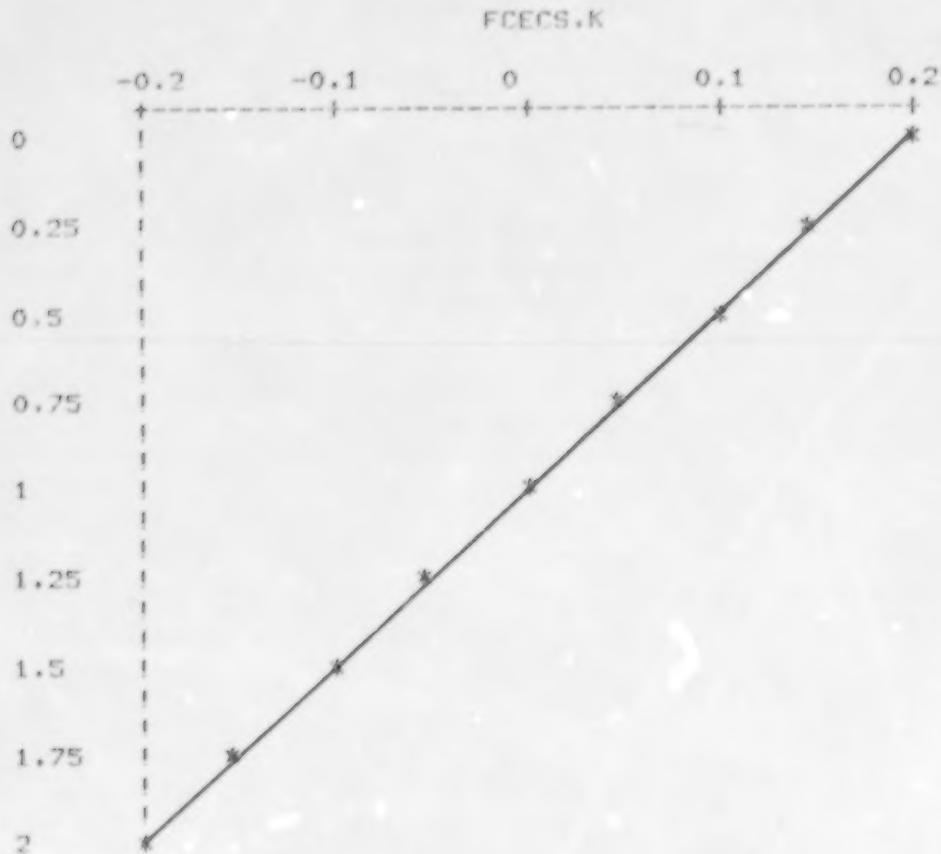
PAELGC.K=TABHL(TPAELG,AEPLS.K/IAEPLS,0.2,.25)
TPAELG=-.6/-.4/-.25/-.1/0/.02/.03/.04/.045

Figure 50

Table Showing Bi-variate Relationship Between Aid-to-Education and Terminations Prior to Graduating from College for Lower Socioeconomic Status Students

PAELGC = Percent from Aid-to-Education on Lower Socioeconomic Status Students Graduating from College
AEPLS = Aid-to-Education Per Lower Socioeconomic Status Student
IAEPLS = Initial Aid-to-Education Per Lower Socioeconomic Status Student

FCECS.K VS CESS.K/ESS.K



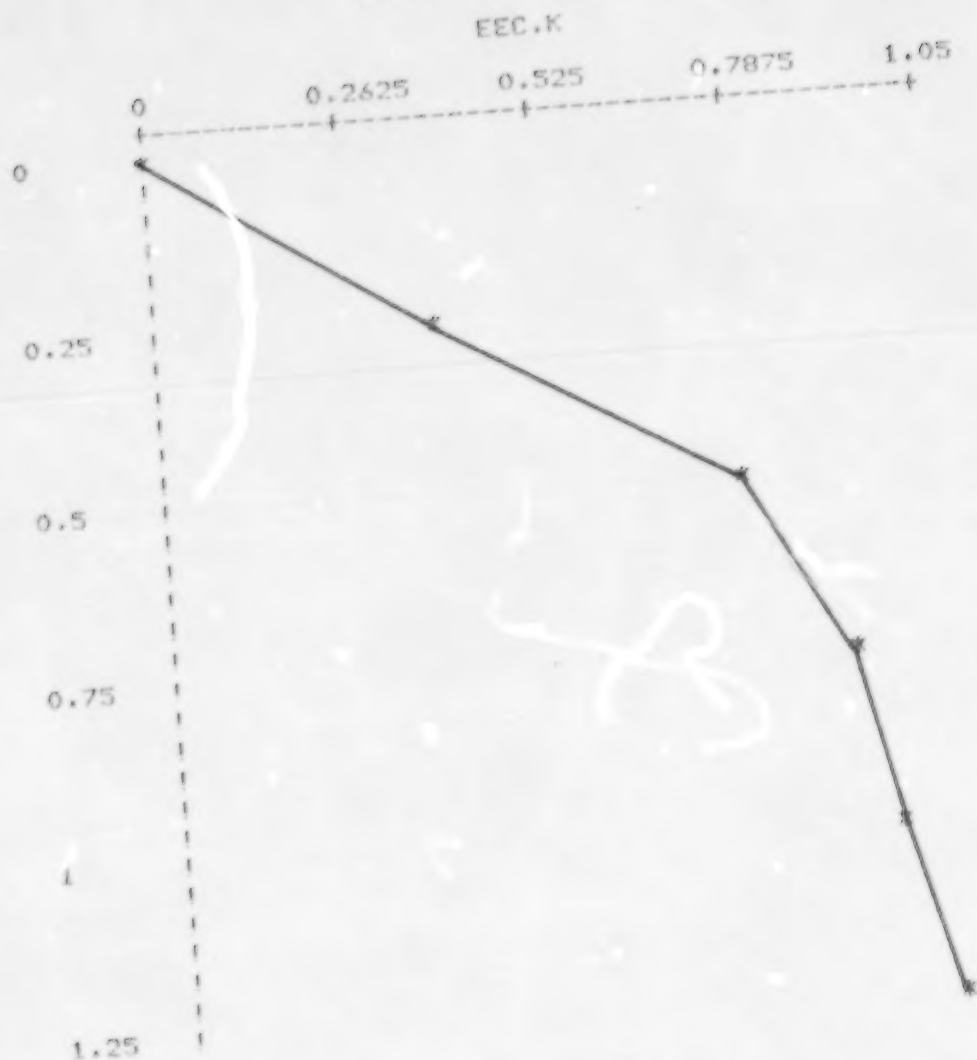
FCECS.K=TABHL(TFCCS+CESS.K/ESS.K*0.2, .25)
TFCCS=.2/.15/.1/.05/0/-.05/-.1/-.15/-.2

Figure 5P

Table Showing Bi-variate Relationship Between Expansion of Capacity and Number of Students Entering Elementary School (Same for All Levels of Education System)

FCECS = Fractional Change in Elementary Capacity from Short-Fall
CESS = Capacity of Elementary School System
ESS = Elementary School Students
TFCCS = Table of Fractional Change from Short-Fall

- 163 -
EEC.K VS CESS.K/ESS.K



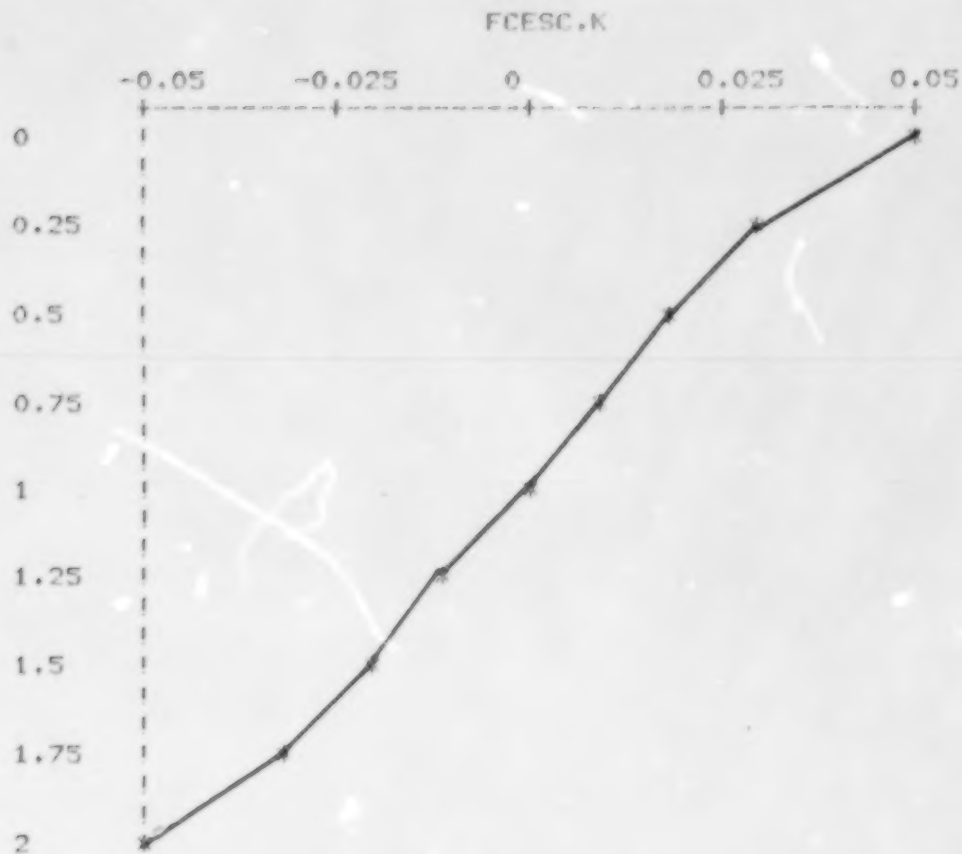
EEC.K=TABHL(TEC,CESS.K/ESS.K,0,1.25,.25)
TEC=0/.4/.8/.95/1/1.05

Figure 5Q

Table Showing Bi-variate Relationship Between Capacity and Terminations at the Elementary School Level (Same for All Levels of the Education System)

EEC = Effect of Elementary Capacity
CESS = Capacity of Elementary School
ESS = Elementary School Students

FCESC.K VS CESS.K/ESS.K



FCESC.K=TABHL(TFCSC,CESS.K/ESS.K,0.2,.25)
TFCSC=.05/.03/.02/.01/0/-.01/-.02/-.03/-.05

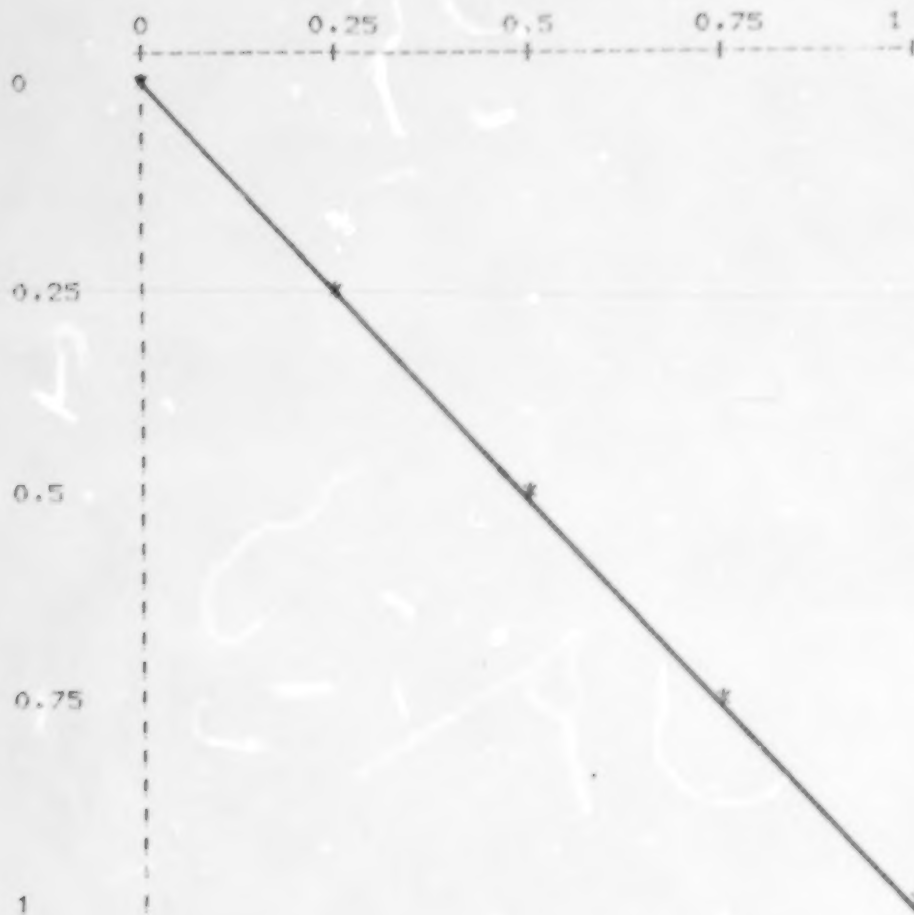
Figure 5R

Table Showing Bi-variate Relationship Between Capacity and Standards at the Elementary School Level (Same for All Levels of the Education System)

FCESC = Fractional Change in Elementary Standards from Capacity
CESS = Capacity of Elementary School System
ESS = Elementary School Students

ESLESS.K VS ALS.K/SEL.K

ESLESS.K



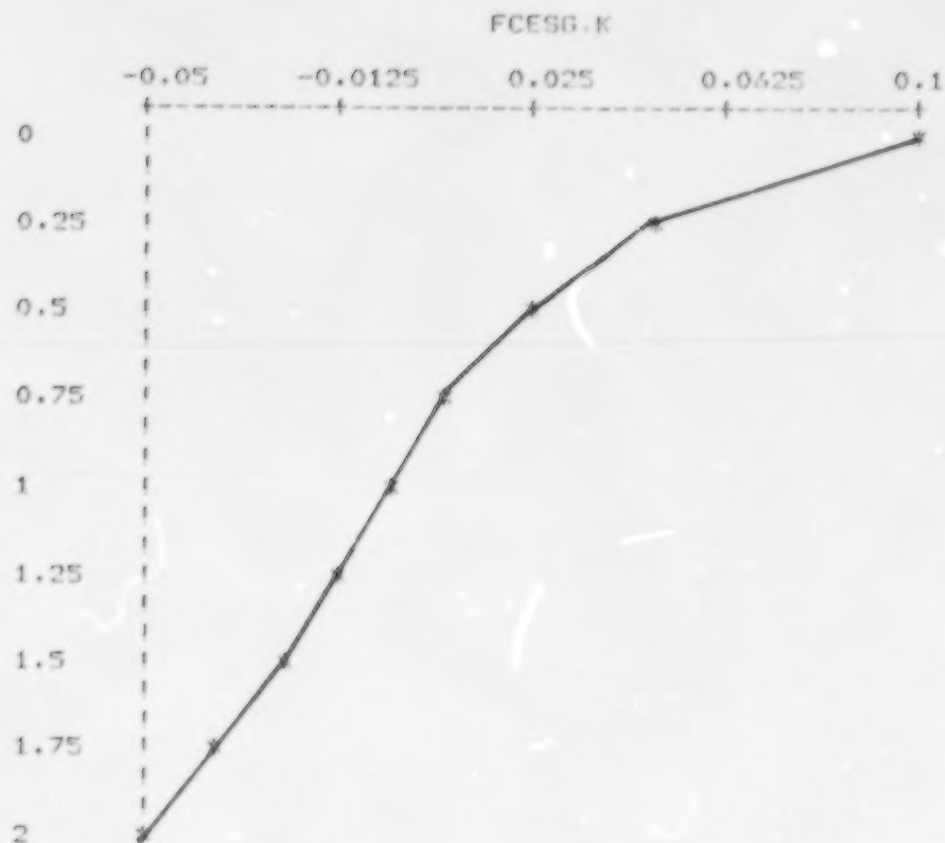
ESLESS.K=TABHL(TESG,ALS.K/SEL.K,0,1,.25)
TESG=0/.25/.5/.75/1

Figure 55

Table Showing Bi-variate Relationship Between Lower Socioeconomic Status Student Achievement/Standards and Terminations Prior to Entering Secondary Schools (Same for All Levels of the Education System and for Both Social Classes)

ESLESS = Effect of Standards on Lower Socioeconomic Status Students Entering Secondary School
ALS = Achievement of Lower Socioeconomic Status Students
SEL = Standards at the Elementary Level

FCESG.K VS EAG.K/NEAG



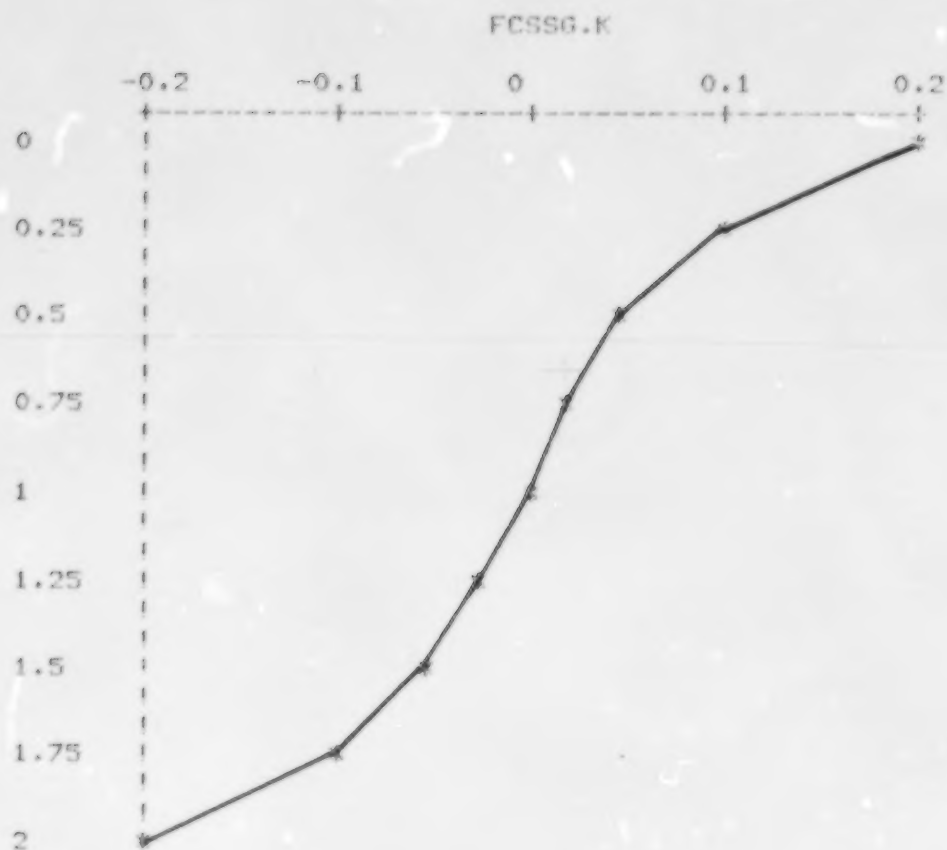
FCESG.K=TABLE(TFCESG,EAG.K/NEAG,0.2,.25)
TFCESG=.1/.05/.025/.01/0/-.01/-.02/-.035/-.05

Figure 5T

Table Showing Bi-variate Relationship Between Standards and Perceived Educational Attainment Gap at the Elementary School Level

FCESG = Fractional Change in Elementary Standards from the Educational Attainment Gap
EAG = Educational Attainment Gap
NEAG = Normal Educational Attainment Gap

FCSSG.K VS EAG.K/NEAG

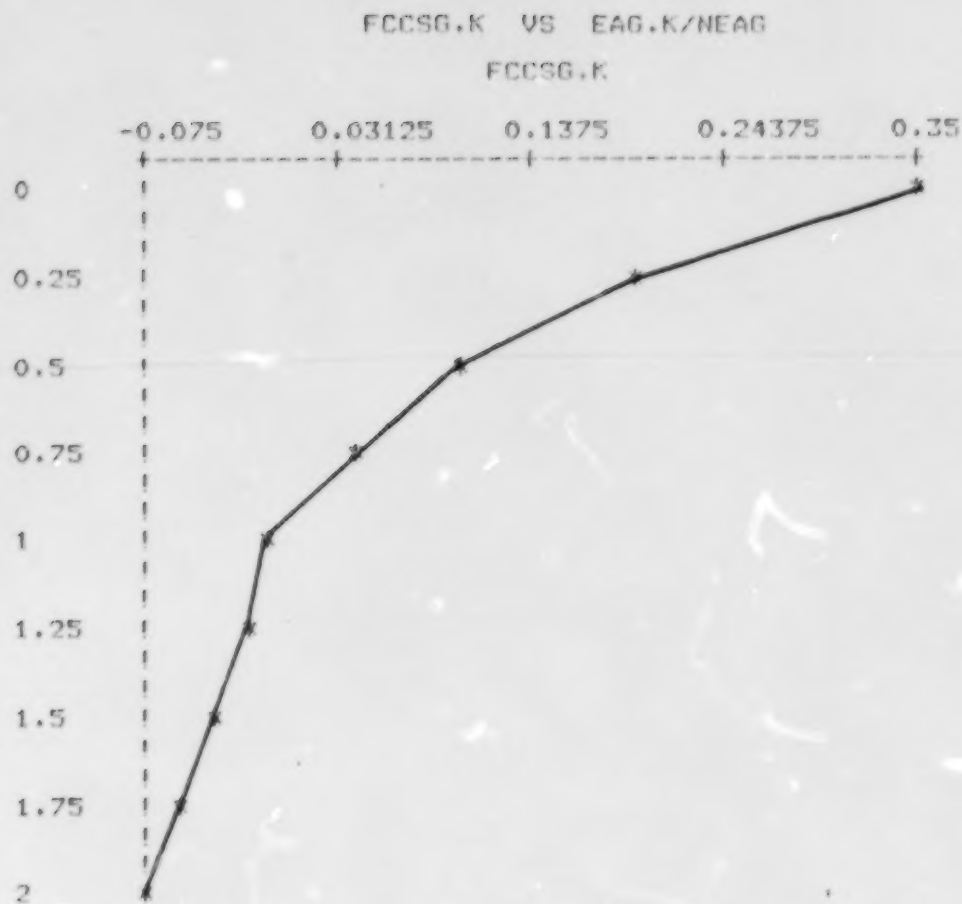


FCSSG.K=TABHL(TFCSSG,EAG.K/NEAG,0,2,.25)
TFCSSG=.2/.1/.05/.025/0/-.025/-.05/-.1/-.2

Figure 5U

Table Showing Bi-variate Relationship Between Standards and Perceived Educational Attainment Gap at the Secondary School Level

FCSSG = Fractional Change in Secondary Standards from the Educational Attainment Gap
EAG = Educational Attainment Gap
NEAG = Normal Educational Attainment Gap



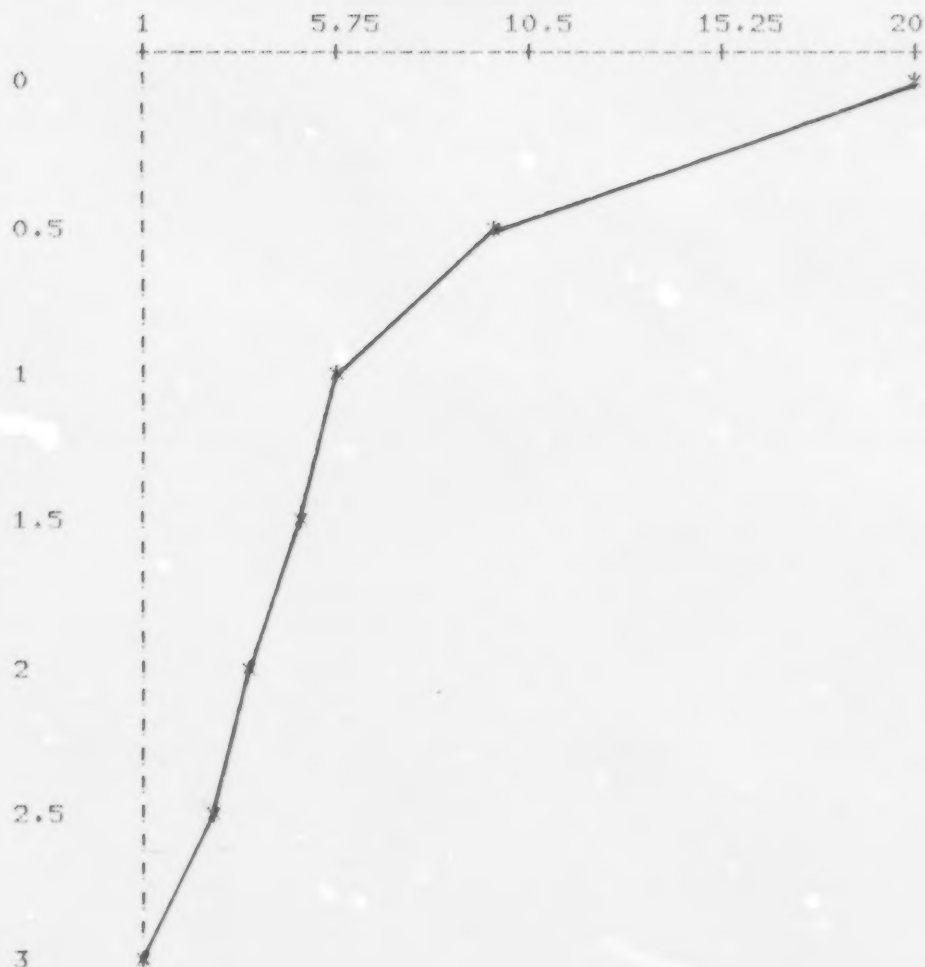
FCCSG,K=TABHL(TFCCSG,EAG,K/NEAG,0,2,.25)
 TFCCSG=.35/.2/.1/.05/0/-.01/-.03/-.05/-.075

Figure 5v

Table Showing Bi-variate Relationship Between Standards and Perceived Educational Attainment Gap at the College Level

FCCSG = Fractional Change in College Standards from the Educational Attainment Gap
 EAG = Educational Attainment Gap
 NEAG = Normal Educational Attainment Gap

- 169 -
 TCALS.K VS AEPLS.K/IAEPLS
 TCALS.K



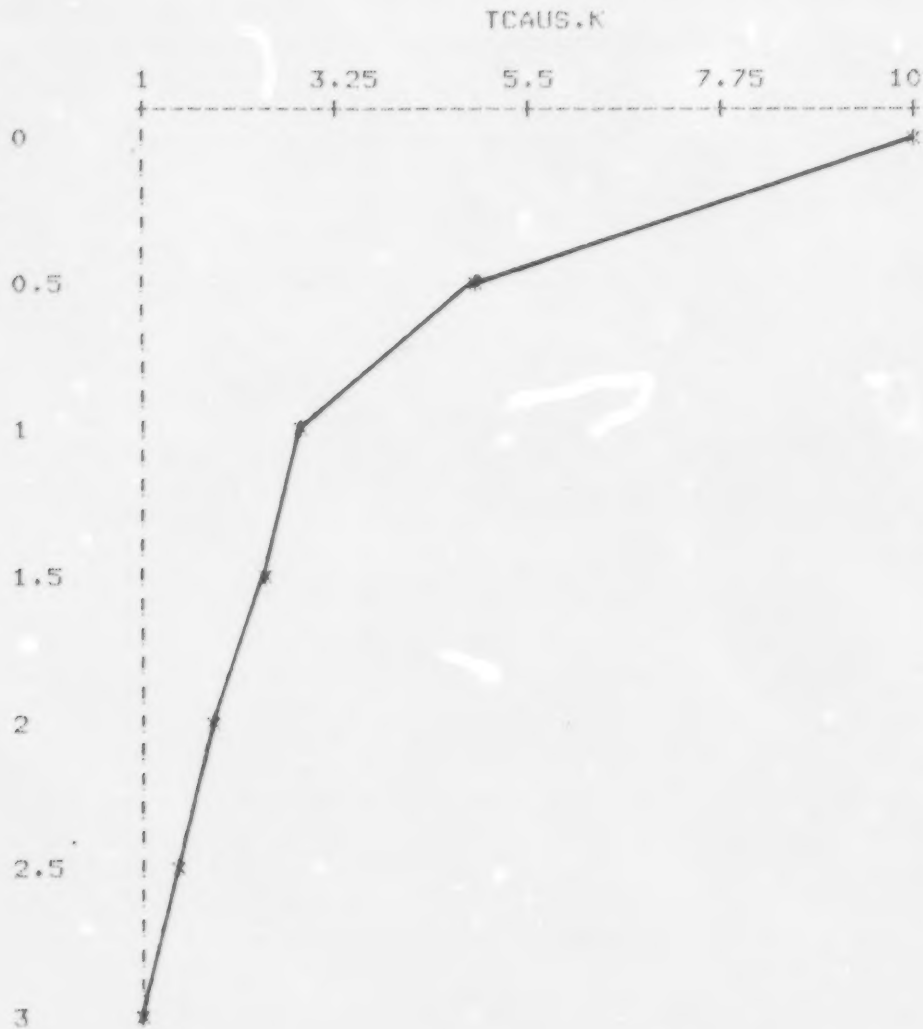
TCALS.K=TABHL(TTCAL,AEPLS.K/IAEPLS,0,3,.5)
 TTCAL=20/10/6/5/4/3/1

Figure 5W

Table Showing Bi-variate Relationship Between Aid-to-Education
 and Time to Change Achievement of Lower Socioeconomic Status
 Students

TCALS = Time to Change Achievement of Lower Socioeconomic Status
 Students
 AEPLS = Aid-to-Education of Lower Socioeconomic Status Students
 IAEPLS = Initial Aid-to-Education of Lower Socioeconomic Status
 Students

TCAUS.K VS AEPUS.K/IAEPUS



TCAUS.K=TABHL(TTCAU,AEPUS.K/IAEPUS,0,3,.5)
TTCAU=10/5/3/2.5/2/1.5/1

Figure 5X

Table Showing Bi-variate Relationship Between Aid-to-Education and, Time to Change Achievement of Upper Socioeconomic Status Students

TCAUS = Time to Change Achievement of Upper Socioeconomic Status Students
AEPUS = Aid-to-Education of Upper Socioeconomic Status Students
IAEPUS = Initial Aid-to-Education of Upper Socioeconomic Status Students

PJLES.K VS TALET.K/NTALET

PJLES.K



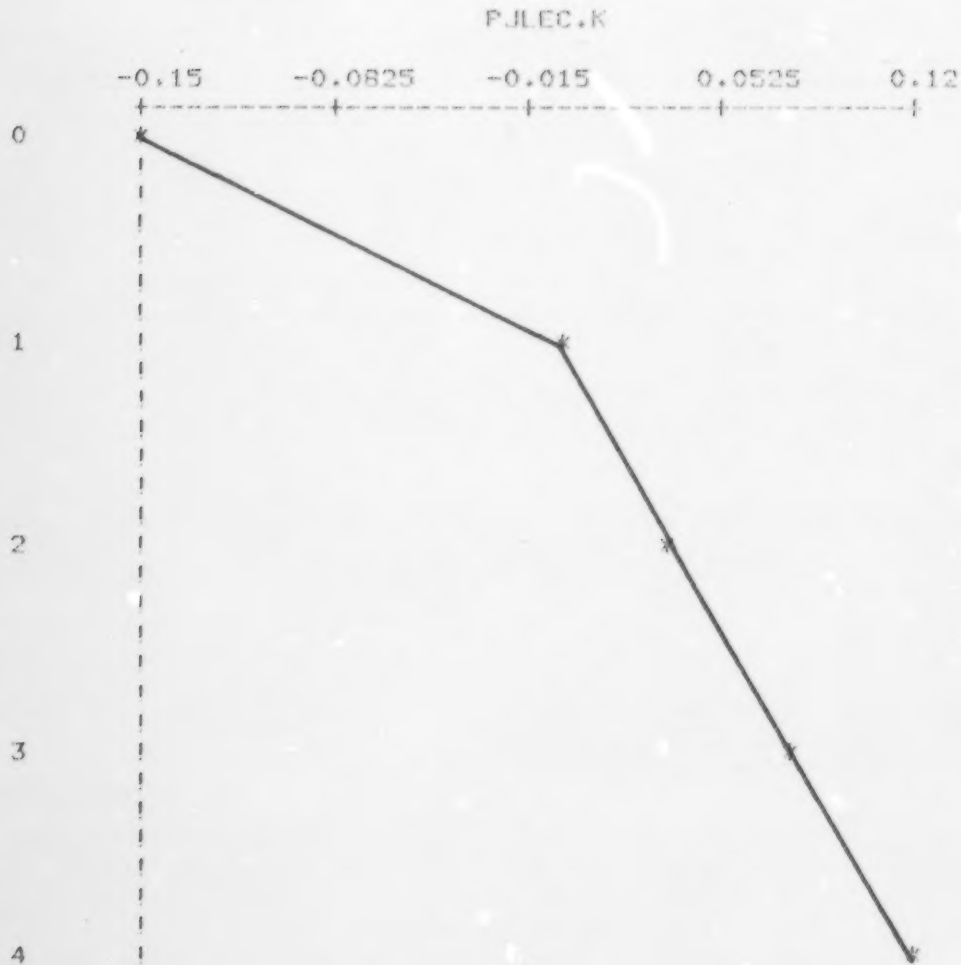
PJLES.K=TABHL(TPJLES,TALET.K/NTALET,0,4,1)
TPJLES=-.5/0/.005/.01/.015

Figure 5Y

Table Showing Bi-variate Relationship Between Time to Absorb Lower Socioeconomic Status School Terminators into Jobs and Termination Prior to Entering Secondary School (Same for Upper Socioeconomic Status Terminators)

PJLES = Percent from Jobs from Lower Socioeconomic Status Students Entering Secondary School
TALET = Time to Absorb Lower, Socioeconomic Status Elementary Terminators into Jobs
NTALET = Normal Time to Absorb Lower Socioeconomic Status Elementary Terminators into Jobs

PJLEC.K VS TALST.K/NTALST



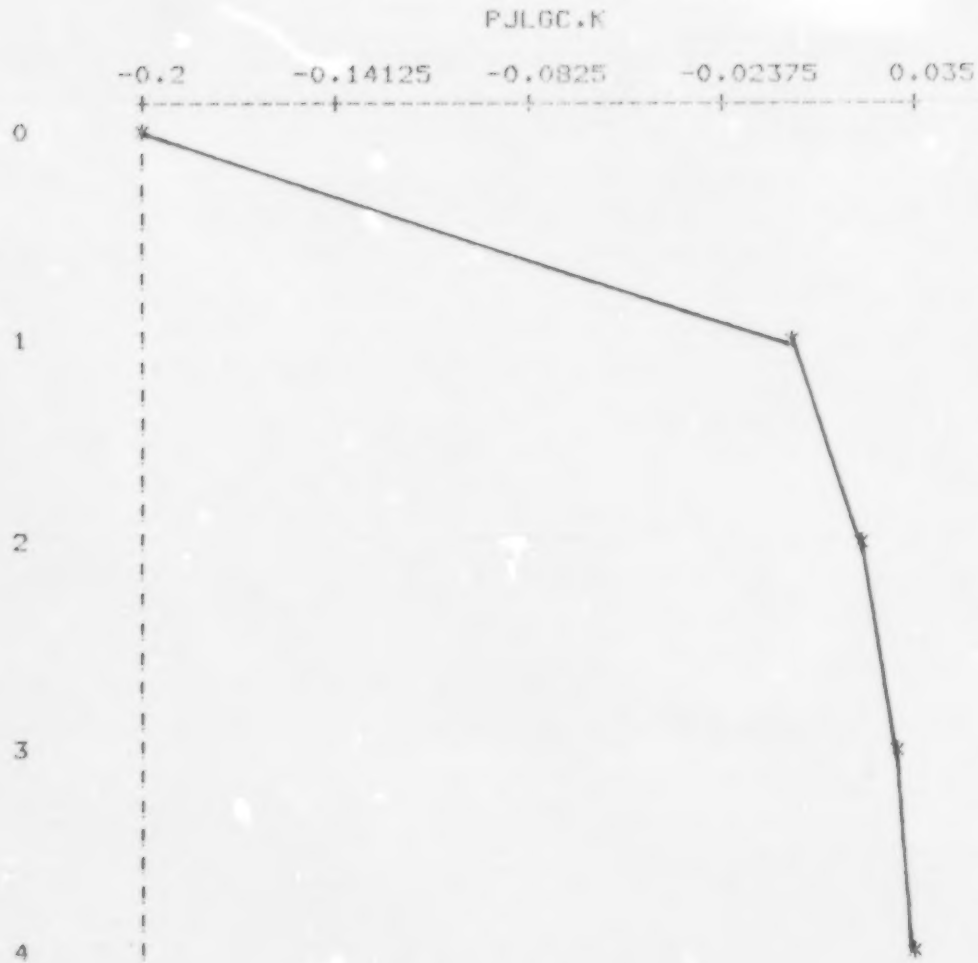
PJLEC.K=TABHL(TPJLEC,TALST.K/NTALST,0.4,1)
 TPJLEC=-.15/0/.04/.08/.12

Figure 52

Table Showing Bi-variate Relationship Between Time to Absorb Lower Socioeconomic Status School Terminators Into Jobs and Termination Prior to Entering College (Same for Upper Socioeconomic Status Terminators)

- PJLEC = Percent from Jobs for Lower Socioeconomic Status Students Entering College
- TALST = Time to Absorb Lower Socioeconomic Status Secondary Terminators into Jobs
- NTALST = Normal Time to Absorb Lower Socioeconomic Status Secondary School Terminators into Jobs

PJLGC,K VS TALCT,K/NTALCT



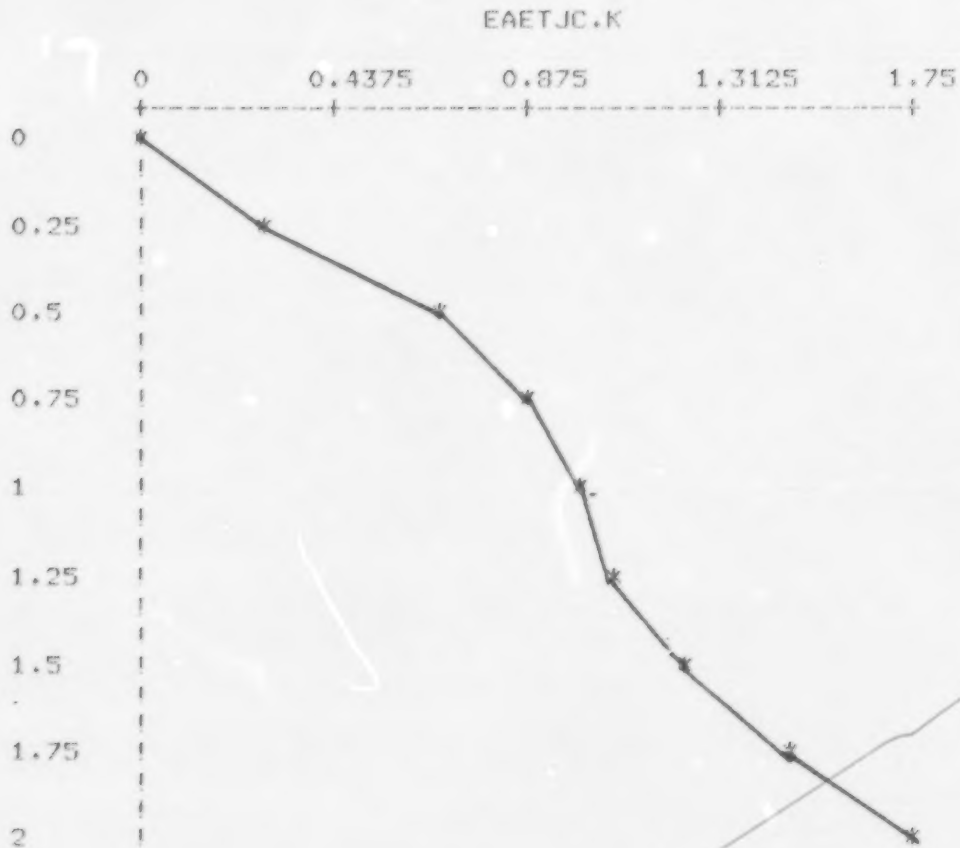
PJLGC,K=TABHL(TPJLGC,TALCT,K/NTALCT,0,4,1)
TPJLGC=-.2/0/.02/.03/.035

Figure 5AA

Table Showing Bi-variate Relationship Between Time to Absorb Lower Socioeconomic Status College Terminators into Job and Termination Prior to College Graduation (Same for Upper Socioeconomic Status Terminators)

PJLGC = Percent from Jobs from Lower Socioeconomic Status Students Graduating College
TALCT = Time to Absorb Lower Socioeconomic Status College Terminators into Jobs
NTALCT = Normal Time to Absorb Lower Socioeconomic Status Terminators into Jobs

EAETJC.K VS URET.K



EAETJC.K=TABHL(TEAT,URET.K,0,2,.25)
TEAT=0/.3/.7/.9/1/1.1/1.25/1.5/1.75

Figure 5BB

Table Showing Bi-variate Relationship Between Unemployment of Elementary School Terminators and Effects of Terminators on Job Creation (Same for All Levels of the Education System)

EAETJC = Effect of Available Elementary Terminators on Job Creation
URET = Unemployment Rates for Elementary Terminators

APPENDIX II
PART 1: MODEL EQUATIONS

START: JOB 0973 0:54:49 TUE OCT 14, 1980 BATCH004

/JOB SED900 RMT Q J0973 305 050
/JOB NOPRINT

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1 /JOB NSEGS=9
2 /FILE UNIT=(6,LIBOUT),DSN=CERPOL
3 /FILE DISK=(1,UR,CCTG,DYNAMO),DISP=SHR
4 /OPT OLDTC4
5 /LOAD OS,PARM=(DYNAMO,1)
6 *      A MODEL OF THE CONTEST FOR EDUCATIONAL RESOURCES
7 NOTE
8 NOTE
9 NOTE      PEOPLE FLOWS
10 NOTE
11 NOTE      1. UPPER SOCIOECONOMIC STATUS
12 NOTE
13 NOTE      A. ELEMENTARY LEVEL
14 L UES,K=UES,J+(DT)*(UEES,JK-UESS,JK-UETR,JK)
15 N UES=IUES
16 C UES=1E7
17 F UES,KL=SWITCH(EUEES,K,HUEES,K,ES)*EEC,K
18 A EUES,K=EUE
19 N EU=UESS+UETR
20 A HUFES,K=TABHL(THUEES,TIME,K,1900,1980,10)
21 T THUEES=1E3/1.5E3/2E3/2.5E3/3E3/3.5E3/4E3/4.5E3/5E3
22 C ES=0
23 A EEC,K=TABHL(TEC,CESS,K/ESS,K,0,1.25,.25)
24 T TEC=0/.4/.8/.95/1/1.05
25 A ESS,K=UES,K+LES,K
26 R UESS,KL=UES,K*FUESSY,K
27 A FUESSY,K=MFESSY*PMUESS,K
28 C MFESSY=.125
29 A PMUESS,K=(NPMUES+PJUES,K+PAEUES,K)*ESUESS,K*ESC,K*EACCESS,K
30 N NPMUES=(1-(((UJET/NTAUET)+(UJET/ALET)-(UJET/NLEUET)))/
31 X (UES*MFESSY))*(1-ES))+(ES*PMUESN)
32 C PMUESN=.05
33 A PJUES,K=TABHL(TPJUES,TAUET,K/NTAUET,0,4,1)
34 T TPJUES=-.5/0/.005/.01/.015
35 A PAEUES,K=TABHL(TPAEUS,AEPUK,K/IAEPUK,0,2,.25)
36 T TPAEUS=-.05/-04/-03/-015/0/.001/.0015/.00175/.00177
37 A ESUESS,K=TABHL(TEUG,AUS,K/SEL,K,0,1.5,.25)
38 T TEUG=0/.25/.5/.75/1/1
39 A ESC,K=TABHL(TEC,CSS,K/SSS,K,0,1.25,.25)
40 A EACCESS,K=TABHL(TEACA,FPLACE,K,0,1,.2)
41 T TEACA=1/1/1/.7/.4/0
42 A FPLACE,K=AAUCES/LPL,K
43 C AAUCES=12
44 A LPL,K=TABHL(TLPL,TIME,K,1900,1980,20)
45 T TLPL=35/37/43/48/54/58/63/68/71/72
46 R UETR,KL=UES,K*FUTE,K
47 A FUTE,K=MFESSY-FUESSY,K
48 L UJET,K=UJET,J+(DT)*(UETR,JK-EUET,JK+TUET,JK-UUETO,JK)
49 N UJET=ITULF*IFUET
50 R EUET,KL=UJET,K/TAUET,K
51 A TAUET,K=NTAUET*EJAUT,K
52 N NTAUET=((UJET/((UJET/NLEUET)+(UJET/ALET)))*(1-ES))+(ES*TAUETN)
53 C TAUETN=1
54 A EJAUT,K=TABHL(TEJAUT,(UJET,K+LEET,K)/JET,K,0,2,.25)
55 T TEJAUT=.5/.6/.7/.9/1/8/15/30/60
56 R TUET,KL=UJET,K/ALEUET,K
57 A ALEUET,K=NLEUET*EJLUET,K
58 C NLEUET=2
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59 A EJLUET.K=TABHL(TEJLUE,(UEET.K+LEET.K)/JET.K,0,2,.25)
60 T TEJLUE=1.4/1.35/1.3/1.2/1/.9/.7/.5/.25
61 R UETD.KL=UEET.K/ALET.K
62 A ALET.K=LPL.K-AAUTES
63 C AAUTES=10
64 L UEET.K=UEET.J+(DT)(EUET.JK-TUET.JK-UETD.JK)
65 N UEET=ITELF*IFUET
66 R UETD.KL=UEET.K/ALET.K
67 NOTE
68 NOTE      B. SECONDARY LEVEL
69 L USS.K=USS.J+(DT)(UESS.JK-UEC.JK-USTR.JK)
70 N USS=(ES*INUSS)+((1-ES)*IEUSS)
71 C INUSS=.75E6
72 N IEUSS=UESS*MFESSY*NPMEUC/MFECY
73 R UEC.KL=USS.K*FUECY.K
74 A FUECY.K=MFECY*PMUEC.K
75 C MFECY=.25
76 A PMUEC.K=(NPMEUC+PJUEC.K+PAUEC.K)*ESUEC.K*ECC.K*EACEC.K
77 N NPMEUC=(1-(((UUST/NTAUST)+(UUST/ALST)-(UEST/NLEUST)))/
78 X (USS*MFECY))*((1-ES))+(ES*PMUECN)
79 C PMUECN=.6
80 A PJUEC.K=TABHL(TPJUEC,TAUST.K/NTAUST,0,4,1)
81 T TPJUEC=-.15/0/.04/.08/.12
82 A PAUEC.K=TABHL(TPAUEC,AEPUK.K/IAEPUK,0,2,.25)
83 T TPAUEC=-.15/-0.1/-0.05/-0.025/0/.01/.025/.04/.05
84 A ESUEC.K=TABHL(TEUG,AUS.K/SSL.K,0,1.5,.25)
85 A ECC.K=TABHL(TEC,CC.K/CS.K,0,1.25,.25)
86 A EACEC.K=TABLE(TEACA,FPLASE.K,0,1,.2)
87 A FPLASE.K=AAUCSS/LPL.K
88 C AAUCSS=18
89 R USTR.KL=USS.K*FUTS.K
90 A FUTS.K=MFECY-FUECY.K
91 L UUST.K=UUST.J+(DT)(USTR.JK-EUST.JK+TUST.JK-UUSTD.JK)
92 N UUST=ITULF*IFUUST
93 R EUST.KL=UUST.K/TAUST.K
94 A TAUST.K=NTAUST*EJAUST.K
95 N NTAUST=((UUST/((UEST/NLEUST)+(UEST/ALST)))*((1-ES)))+(ES*TAUSTN)
96 C TAUSTN=.75
97 A EJAUST.K=TABHL(TEJAUT,(UEST.K+LEST.K)/JST.K,0,2,.25)
98 R TUST.KL=UEST.K/ALEUST.K
99 A ALEUST.K=NLEUST*EJLUST.K
100 C NLEUST=3
101 A EJLUST.K=TABHL(TEJLUE,(UEST.K+LEST.K)/JST.K,0,2,.25)
102 R UUSTD.KL=UUST.K/ALST.K
103 A ALST.K=LPL.K-AAUTSS
104 C AAUTSS=16
105 L UEST.K=UEST.J+(DT)(EUST.JK-TUST.JK-UESTD.JK)
106 N UEST=ITELF*IFEUST
107 R UESTD.KL=UEST.K/ALST.K
108 A SSS.K=USS.K+LSS.K
109 NOTE
110 NOTE      C. COLLEGE LEVEL (INCLUDES GRAD SCHOOL)
111 L UCS.K=UCS.J+(DT)(UEC.JK-UCGR.JK-UCT.JK)
112 N UCS=((1-ES)*IEUCS)+(ES*INUCS)
113 N IEUCS=USS*MFECY*NPMEUC/MFGCY
114 C INUCS=1E5
115 R UCGR.KL=UCS.K*FUGCY.K
116 A FUGCY.K=MFECY*PMUGC.K
117 C MFECY=.2
118 A PMUGC.K=(NPMEUC+PJUGC.K+PAEUGC.K)*ESUGC.K*EACGC.K
119 N NPMEUC=(1-(((UUCT/NTAUCT)+(UUCT/ALCT)-(UECT/NLEUCT)))/
120 X (UCS*MFECY))*((1-ES))+(ES*PMUGCN)

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121 C PMUGCN=.75
122 A PJUGC.K=TABHL(TPJUGC,TAUCT.K/NTAUCT,0,4,1)
123 T TPJUGC=-.2/0/.02/.03/.035
124 A PAEUGC.K=TABHL(TPAEUG,AEPUK.K/IAEPUK,0,2,.25)
125 N PAEUGC=0
126 T TPAEUG=-.1/- .05/- .02/- .01/0/.02/.03/.04/.045
127 N ESUGC=1
128 A ESUGC.K=TABHL(ESUG,AUS.K/SCL.K,0,1,5,.25)
129 A EACGC.K=TABHL(TEACA,FPLACE.K,0,1,.2)
130 A FPLACE.K=AAUCC/LPL.K
131 C AAUCC=23
132 R UCT.KL=UCS.K*FUTC.K
133 A FUTC.K=MFGCY-FUGCY.K
134 L UUCT.K=UUCT.J+(DT)(UCT.JK-EUCT.JK+TUCT.JK-UUCTD.JK)
135 N UUCT=ITULF*IFUUCT
136 R EUCT.KL=UUCT.K/TAUCT.K
137 A TAUCT.K=NTAUCT*EJAUCT.K
138 N NTAUCT=((UUCT/((UECT/NLEUCT)+(UECT/ALCT)))*(1-ES))+(ES*TAUCTN)
139 C TAUCTN=.5
140 A EJAUCT.K=TABHL(TEJAUT,(UECT.K+LECT.K)/JCT.K,0,2,.25)
141 R TUCT.KL=UECT.K/ALEUCT.K
142 A ALEUCT.K=NLEUCT*EJLUCT.K
143 C NLEUCT=4
144 A EJLUCT.K=TABHL(TEJLUE,(UECT.K+LECT.K)/JCT.K,0,2,.25)
145 R UUCTD.KL=UUCT.K/ALCT.K
146 A ALCT.K=LPL.K-AAUTC
147 C AAUTC=21
148 L UECT.K=UECT.J+(DT)(EUCT.JK-TUCT.JK-UECTD.JK)
149 N UECT=ITCLF*IFEUCT
150 R UECTD.KL=UECT.K/ALCT.K
151 L UCG.K=UCG.J+(DT)(UCGR.JK-UCGD.JK)
152 N UCG=UCGR*ALCG
153 R UCGD.KL=UCG.K/ALCG.K
154 A ALCG.K=LPL.K-AAUCC
155 A CS.K=UCS.K+LCS.K
156 NOTE
157 NOTE 2. LOWER SOCIOECONOMIC STATUS
158 NOTE
159 NOTE A. ELEMENTARY LEVEL
160 L LES.K=LES.J+(DT)(LEES.JK-LESS.JK-LETR.JK)
161 N LES=ILES
162 C ILES=.2E7
163 F LEES.KL=SWITCH(ELEES.K,HLEES.K,ES)*EEC.K
164 A ELEES.K=ELE
165 N ELE=LESS+LETR
166 A HLEES.K=TABHL(THLEES,TIME.K,1900,1980,10)
167 T THLEES=1E3/1.5E3/2E3/2.5E3/3E3/3.5E3/4E3/4.5E3/5E3
168 P LESS.KL=LES.K*FLESSY.K
169 A FLESSY.K=MFESSY*PMLESS.K
170 A PMLESS.K=(NPMLES+PJLES.K+PAELES.K)*ESLESS.K*ESC.K*EACCESS.K
171 N NPMLES=(1-(((ULET/NTALET)+(ULET/ALET)-(LEET/NLEET)))/(LES*MFESSY))*(1-ES))+(ES*PMLESN)
172 X (LES*MFESSY))*(1-ES))+(ES*PMLESN)
173 C PMLESN=.75
174 A PJLES.K=TABHL(TPJLES,TALET.K/NTALET,0,4,1)
175 T TPJLES=-.5/0/.005/.01/.015
176 A PAELES.K=TABHL(TPAELS,AEPLS.K/IAEPLS,0,2,.25)
177 T TPAELS=-.25/- .15/- .075/- .03/0/.02/.05/.15/.25
178 A ESLESS.K=TABHL(TESLG,ALS.K/SEL.K,0,1,5,.25)
179 T TESLG=0,.25,.5,.75,1,1.25,1.4
180 R LETR.KL=LES.K*FLTE.K
181 A FLTE.K=MFESSY-FLESSY.K
182 L ULET.K=ULET.J+(DT)(LETR.JK-FLET.JK+TLET.JK-ULETD.JK)

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183 N ULET=ITOLF*IFULET
184 R ELET,KL=ULET.K/TALET.K
185 A TALET,K=NTALET*EJALET.K
186 N NTALET=((ULET/((LEET/NLELET)+(LEET/ALET)))*(1-ES))+(ES*TALETN)
187 C TALETN=1.5
188 A EJALET,K=TABHL(TEJALT,(UEET.K+LEET.K)/JET.K,0,2,.25)
189 T TEJALT=.5/.6/.7/.9/1/8/15/30/60
190 R TLET,KL=LEET.K/ALCLET.K
191 A ALELET,K=NLELET*EJLLET.K
192 C NLELET=2
193 A EJLLET,K=TABHL(TEJLLE,(UEET.K+LEET.K)/JET.K,0,2,.25)
194 T TEJLLE=1.4/1.35/1.3/1.2/1/.9/.7/.5/.25
195 R ULETD,KL=ULET.K/ALET.K
196 L LEET,K=LEET.J+(DT)(ELET.JK-TLET.JK-LEETD.JK)
197 N LEET=ITOLF*IFELET
198 R LEETD,KL=LEET.K/ALET.K
199 NOTE
200 NOTE      B. SECONDARY LEVEL
201 L LSS,K=LSS.J+(DT)(LESS.JK-LEC.JK-LSTR.JK)
202 N LSS=((1-ES)*IELSS)+(ES*INLSS)
203 N IELSS=LESS*MFECY*NPMLCS/MFECY
204 C INLSS=.75ES
205 R LEC,KL=LSS.K*FLECY.K
206 A FLECY,K=MFECY*(PMLEC.K+EFCEC.K)
207 A PMLEC,K=((NPMLC+PJLEC.K+PALEC.K+PALECT.K)*ESLEC.K+ECC.K+EACEC.K)
208 N NPMLC=(1-(((ULST/NTALST)+(ULST/ALST)-(LEST/NLELST)))/
209 X (LSS*MFECY))*(1-ES))+(ES*PMLECN)
210 C PMLECN=.3
211 A PJLEC,K=TABHL(TPJLEC,TALST.K/NTALST,0,4,1)
212 T TPJLEC=-.15/0/.04/.08/.12
213 C TALSTN=1
214 A PALEC,K=TABHL(TPAELC,AEPLS.K/IAEPLS,0,2,.25)
215 T TPAELC=-.5/-/.35/-/.2/-/.1/0/.01/.025/.04/.05
216 A PALECT,K=CLIP(APA,0,TIME.K,TIPA)
217 C APA=.5
218 C TIPA=2ES
219 A ESLEC,K=TABHL(TESLG,ALS.K/SGL.K,0,1.5,.25)
220 R LSTR,KL=LSS.K*FLTS.K
221 A FLTS,K=MFECY-FLECY.K
222 L ULST,K=ULST.J+(DT)(LSTR.JK-ELST.JK+TLST.JK-ULSTD.JK)
223 N ULST=ITOLF*IFULST
224 R ELST,KL=ULST.K/TALST.K
225 A TALST,K=NTALST*EJALST.K*ERAT.K
226 N NTALST=((ULST/((LEST/NLELST)+(LEST/ALST)))*(1-ES))+(ES*TALSTN)
227 A EJALST,K=TABHL(TEJALT,(UEST.K+LEST.K)/JST.K,0,2,.25)
228 R TLST,KL=LEST.K/ALELST.K
229 A ALELST,K=NLELST*EJLLST.K
230 C NLELST=3
231 A EJLLST,K=TABHL(TEJLLE,(UEST.K+LEST.K)/JST.K,0,2,.25)
232 A ERAT,K=CLIP(AAT,NAT,TIME.K,TIERAT)
233 C AAT=.5
234 C NAT=1
235 C TIERAT=2ES
236 A EFCEC,K=(1-PMLEC.K)*CLIP(FCLEC,0,TIME.K,TIFCEC)
237 C FCLEC=.5
238 C TIFCEC=2ES
239 R ULSTD,KL=ULST.K/ALST.K
240 L LEST,K=LEST.J+(DT)(ELST.JK-TLST.JK-LESTD.JK)
241 N LEST=ITOLF*IFELST
242 R LESTD,KL=LEST.K/ALST.K
243 NOTE
244 NOTE      C. COLLEGE LEVEL (INCLUDES GRAD SCHOOL)

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245 L LCS.K=LCS.J+(DT)(LEC.JK-LCGR.JK-LCT.JK)
 246 N LCS=((1-ES)*IELCS)+(ES*INLCS)
 247 N IELCS=LCS*MFECY*NPMLGC/MFGCY
 248 C INLCS=.1ES
 249 R LCGR.KL=LCS.K*FLGCV.K
 250 A FLGCV.K=MFGCY*PMLGC.K
 251 A PMLGC.K=(NPMLGC+PJLGC.K+PAELGC.K)*ESLGC.K*EACGC.K
 252 N NPMLGC=(1-((UECT/NTALCT)+(ULCT/ALCT)-(LECT/NLELCT)))/
 253 X (LCS*MFGCY)*(1-ES)+(ES*PMLGCN)
 254 C PMLGCN=.5
 255 A PJLGC.K=TABHL(TPJLGC,TALCT.K/NTALCT,0.4,1)
 256 T TPJLGC=-.2/0/.02/.03/.035
 257 A PAELGC.K=TABHL(TPAELG,AEPLS.K/IAEPLS,0.2,.25)
 258 N PAELGC=0
 259 T TPAELG=-.6/-,.4/-,.25/-,.1/0/.02/.03/.04/.045
 260 N ESLGC=1
 261 A ESLGC.K=TABHL(ESLGC,ALS.K/SCL.K,0.1,5,.25)
 262 R LCT.KL=LCS.K*FLTC.K
 263 A FLTC.K=MFGCY-FLGCV.K
 264 L ULCT.K=ULCT.J+(DT)(LCT.JK-ELCT.JK+TLCT.JK-ULCTD.JK)
 265 N ULCT=ITULF*IFULCT
 266 R ELCT.KL=ULCT.K/TALCT.K
 267 A TALCT.K=NTALCT*EJALCT.K*ERAT.K
 268 N NTALCT=((ULCT/((LECT/NLELCT)+(LECT/ALCT)))*(1-ES)+(ES*TALCTN)
 269 C TALCTN=.65
 270 A EJALCT.K=TABHL(TEJALT,(UECT.K+LECT.K)/JCT.K,0.2,.25)
 271 R TLCT.KL=LECT.K/ALELCT.K
 272 A ALELCT.K=NLELCT*EJLLCT.K
 273 C NLELCT=.4
 274 A EJLLCT.K=TABHL(TEJLLE,(UECT.K+LECT.K)/JCT.K,0.2,.25)
 275 R ULCTD.KL=ULCT.K/ALCT.K
 276 L LECT.K=LECT.J+(DT)(ELCT.JK-TLCT.JK-LECTD.JK)
 277 N LECT=ITULF*IFELCT
 278 R LECTD.KL=LECT.K/ALCT.K
 279 L LCG.K=LCG.J+(DT)(LCGR.JK-LCGD.JK)
 280 N LCG=LLGR*ALCG
 281 R LCGD.KL=LCG.K/ALCG.K
 282 NOTE
 283 NOTE
 284 NOTE CAPACITY
 285 NOTE
 286 NOTE 1. ELEMENTARY LEVEL
 287 L CESS.K=CESS.J+(DT)(CCESS.JK)
 288 N CESS=(URS+LSS)
 289 R CCESS.KL=CESS.K*FCESS.K
 290 A FCESS.K=FCECS.K*SCCC
 291 A FCECS.K=TABHL(TFCCS,CESS.K/ESS.K,0.2,.25)
 292 T TFCCS=.2/.15/.1/.05/0/-.05/-.1/-.15/-.2
 293 C SCCC=0
 294 NOTE
 295 NOTE 2. SECONDARY LEVEL
 296 L CSSS.K=CSSS.J+(DT)(CCSSS.JK)
 297 N CSSS=(URS+LSS)
 298 R CCSSS.KL=CSSS.K*FCCSSS.K
 299 A FCCSSS.K=FCSCS.K*SCSC
 300 A FCSCS.K=TABHL(TFCCS,CSSS.K/SSS.K,0.2,.25)
 301 C SCSC=0
 302 NOTE
 303 NOTE 3. COLLEGE LEVEL
 304 L CC.K=CC.J+(DT)(CCC.JK)
 305 N CC=(URS+LCS)
 306 R CCC.KL=CC.K*FCCC.K

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* 307 A FCCC.K=FCCCS.K*SCCC
* 308 A FCCCS.K=TABHL(TFCCS,CC,K/CS.K,0,2,.25)
* 309 C SCCC=0
* 310 NOTE
* 311 NOTE
* 312 NOTE          JOBS
* 313 NOTE
* 314 NOTE          LABOR FORCE INITIALIZATION
* 315 C ITNGLF=1.5E7
* 316 C IUUF=.15
* 317 N ITLGF=ITNGLF*(1-IUF)
* 318 N ITULF=ITNGLF*IUF
* 319 C IFUDET=.25
* 320 C IFUJST=.05
* 321 C IFUUCT=.02
* 322 C IFULET=.4
* 323 C IFULST=.2
* 324 N IFULCT=1-(IFUDET+IFUUST+IFUUCT+IFULET+IFULST)
* 325 C IFEUET=.15
* 326 C IFEUST=.35
* 327 C IFEUCT=.15
* 328 C IFELET=.05
* 329 C IFELST=.2
* 330 N IFELCT=1-(IFEUET+IFEUST+IFEUCT+IFELET+IFELST)
* 331 NOTE
* 332 NOTE 1. JOBS FOR ELEMENTARY TERMINATORS
* 333 L JET.K=JET.J+(DT)(IJET.JK-DJET.JK)
* 334 N JET=(UEET+LEET)
* 335 R IJET.KL=JET.K*FIJET.K
* 336 A FIJET.K=NFIJET.K*EAETJC.K*EASCTJ.K
* 337 A NFIJET.K=1/ALET.K
* 338 A EAETJC.K=TABHL(TEAT,URET.K,0,2,.25)
* 339 T TEAT=0/.3/.7/.9/1/1.1/1.25/1.5/1.75
* 340 A URET.K=((UDET.K+ULET.K)/TLF.K)/IUET
* 341 A TLF.K=UDET.K+ULET.K+UEET.K+LEET.K+UUST.K+ULST.K+UEST.K+
* 342 X LEST.K+UUCT.K+ULCT.K+UECT.K+LECT.K+UCG.K+LCG.K
* 343 N IUET=(UDET+ULET)/TLF
* 344 A EASCTJ.K=TABHL(TEAHT,URSCT.K,0,2,.25)
* 345 T TEAHT=1.8/1.4/1.25/1.1/1/.8/.5/.2/.05
* 346 A URSCT.K=((UUST.K+ULST.K+UUCT.K+ULCT.K)/TLF.K)/IURSCT
* 347 N IURSCT=(UUST+ULST+UUCT+ULCT)/TLF
* 348 R DJET.KL=JET.K/ALET.K
* 349 NOTE
* 350 NOTE 2. JOBS FOR SECONDARY TERMINATORS
* 351 L JST.K=JST.J+(DT)(IJST.JK-DJST.JK)
* 352 N JST=(UEST+LEST)
* 353 R IJST.KL=JST.K*FIJST.K
* 354 A FIJST.K=NFIJST.K*EASTJC.K*EACTJC.K
* 355 A NFIJST.K=1/ALST.K
* 356 A EASTJC.K=TABHL(TEAT,URST.K,0,2,.25)
* 357 A URST.K=((UUST.K+ULST.K)/TLF.K)/IURST
* 358 N IURST=(UUST+ULST)/TLF
* 359 R DJST.KL=JST.K/ALST.K
* 360 NOTE
* 361 NOTE 3. JOBS FOR COLLEGE TERMINATORS
* 362 L JCT.K=JCT.J+(DT)(IJCT.JK-DJCT.JK)
* 363 N JCT=(UECT+LECT)
* 364 R IJCT.KL=JCT.K*FIJCT.K
* 365 A FIJCT.K=NFIJCT.K*EACTJC.K
* 366 A NFIJCT.K=1/ALCT.K
* 367 A EACTJC.K=TABHL(TEAT,URCT.K,0,2,.25)
* 368 A URCT.K=((UUCT.K+ULCT.K)/TLF.K)/IURCT

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369 N IURCT=(IURCT+ULCT)/TLF
370 R DJCT.KL=JCT.K/ALCT.K
371 NOTE
372 NOTE
373 NOTE ACHIEVEMENT
374 NOTE
375 NOTE 1. UPPER SOCIOECONOMIC STATUS
376 L AUS.K=AUS.J+(DT)(CAUS.JK)
377 N AUS=UEA+UPEF
378 R CAUS.KL=(IAUS.K-AUS.K)/TCAUS.K
379 A IAUS.K=TABHL(TIAPE,UPEEA.K,0,20,4)
380 T TIAPE=0/4/8/12/16/20
381 A UPEEA.K=UPEA.K+UPEF
382 L UPEA.K=UPEA.J+(DT/TACA)(UEA.J-UPEA.J)
383 N UPEA=UEA
384 A UFA.K=((UEET.K+UJET.K)*AYET)+((UEST.K+UUST.K)*AYST)+((UECT.K+UUCT
385 X .K)*AYCT)+(UCG.K*AYCG))/(UEET.K+UJET.K+UEST.K+UUST.K+UECT.K
386 X +UUCT.K+UCG.K)
387 C AYET=5
388 C AYST=10
389 C AYCT=15
390 C AYCG=17
391 C TAEA=25
392 C UPEF=1
393 A TCAUS.K=TABHL(TTCAU,AEPU.S.K/IAEPUS,0,3,.5)
394 T TTCAU=10/5/3/2.5/2/1.5/1
395 NOTE
396 NOTE 2. LOWER SOCIOECONOMIC STATUS
397 L ALS.K=ALS.J+(DT)(CALS.JK+PCALS.JK)
398 N ALS=LEA+LPEF
399 R CALS.KL=(IALS.K-ALS.K)/TCALS.K
400 A IALS.K=TABHL(TIAPE,LPEEA.K,0,20,4)
401 A LPEEA.K=LPEA.K+LPEF+((UPEEA.K-ALPEEA.K)*SACLPE.K)
402 L LPEA.K=LPEA.J+(DT/TAEA)(LEA.J-LPEA.J)
403 N LPEA=LEA
404 A LEA.K=((LEET.K+ULET.K)*AYET)+((LEST.K+ULST.K)*AYST)+
405 X ((LECT.K+ULCT.K)*AYCT)+(LCG.K*AYCG))/(LEET.K+ULET.K+LEST.K+
406 X ULST.K+LECT.K+ULCT.K+LCG.K)
407 C LPEF=0
408 A TCALS.K=TABHL(TTCAL,AEPLS.K/IAEPLS,0,3,.5)
409 T TTCAL=20/10/6/5/4/3/1
410 R PCALS.KL=PULSE(PCAL.K,PCALT,PCALI)
411 A PCAL.K=((AUS.K-ALS.K)*FAA)/DT
412 C FAA=1
413 C PCALT=2E5
414 C PCALI=2E5
415 A ALPEEA.K=SMOOTH(LPEEA.K,TAPE)
416 N ALPEEA=LPEA+LPEF
417 C TAPE=.25
418 A SACLPE.K=CLIP(1,0,TIME.K,TACLPE)
419 C TACLPE=2E5
420 NOTE
421 NOTE
422 NOTE STANDARDS
423 NOTE
424 NOTE 1. ELEMENTARY LEVEL
425 L SEL.K=SEL.J+(DT)(CSEL.JK)
426 N SEL=LEA
427 R CSEL.KL=SEL.K*FCSEL.K
428 A FCSEL.K=FCESG.K+FCESC.K
429 A FCESG.K=TABHL(TFCESG,EAG.K/NEAG,0,2,.25)
430 T TFCESG=.1/.05/.025/.01/0/-.01/-.02/-.035/-.05

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APPENDIX II
PART 2: DEFINITION FILE

431 A EAG.K=UEA.K-LEA.K
 432 A IEAG.K=FAG.K/NEAG
 433 N NEAG=UFA-LEA
 434 A FCESC.K=TABHL(TFCSC,CESS.K/LSS.K,0,2,.25)
 435 T TFCSC=.05/.03/.02/.01/0/-0.01/-0.02/-0.03/-0.05
 436 NOTE
 437 NOTE 2. SECONDARY LEVEL
 438 L SSL.K=SSL.J+(DT)(CSSL.JK+ECG.JK)
 439 N SSL=LEA
 440 R CSSL.KL=SSL.K*FCSSL.K
 441 A FCSSL.K=FCSSG.K+FCSSC.K
 442 A FCSSG.K=TABHL(TFCSSG,EAG.K/NEAG,0,2,.25)
 443 T TFCSSG=.2/.1/.05/.025/0/-0.025/-0.05/-0.1/-0.2
 444 A FCSSC.K=TABHL(TFCSC,CSSS.K/SSS.K,0,2,.25)
 445 R FCS.KL=PULSE(PCG.K,PTCS,PICS)
 446 A PCG.K=(SSL.K*FCS)/DT
 447 C FCS=.25
 448 C PTCS=2E5
 449 C PICS=2E5
 450 NOTE
 451 NOTE 3. COLLEGE LEVEL
 452 L SCL.K=SCL.J+(DT)(CSCL.JK+ECG.JK)
 453 N SCL=LEA
 454 R CSCL.KL=SCL.K*FCCS.K
 455 A FCCS.K=FCSSG.K+FCCSC.K
 456 A FCCSG.K=TABHL(TFCCSG,EAG.K/NEAG,0,2,.25)
 457 T TFCCSG=.35/.2/.1/.05/0/-0.01/-0.03/-0.05/-0.075
 458 A FCCSC.K=TABHL(TFCSC,CC.K/CS.K,0,2,.25)
 459 NOTE
 460 NOTE
 461 NOTE AID-TO-EDUCATION
 462 NOTE
 463 A FAAE.K=GNP.K*FGNPAE.K
 464 A GNP.K=TABHL(TGNP,TIME.K,1800,1980,20)
 465 T TGNP=3E12/3E12/3E12/3E12/3E12/3E12/3E12/3E12/3E12
 466 A FGNPAE.K=CLIP(AF,IF,TIME.K,TAFGNP)
 467 N AF=IF*FAEF
 468 C IF=.01
 469 C FAEF=.75
 470 C TAFGNP=2E5
 471 A ACAUS.K=FAAE.K*FAEAUS.K
 472 L FAEAUS.K=FAEAUS.J+(DT)(CFAEAU.JK-PCFAU.JK)
 473 N FAEAUS=((UES*ICPES)+(USS*ICPSS)+(UCS*ICPCS))/(((UES+LES)*ICPES)+
 474 X ((USS+LSS)*ICPSS)+((UCS+LCS)*ICPCS))
 475 R CFAEAU.KL=FAEAUS.K*FCAEU.K
 476 A FCAEU.K=TABHL(TFCAEU,FAEAUS.K/IFAEAU.K,0,2,.25)
 477 T TFCAEU=1/.75/.5/.25/0/-0.1/-0.2/-0.3/-0.5
 478 A IFAEAU.K=IFAEU.K+((1-IFAEU.K)*EAGUAF.K)
 479 A IFAEU.K=TCAEU.K/TCAE.K
 480 A TCAEU.K=(UES.K*CPES.K)+(USS.K*CPSS.K)+(UCS.K*CPCS.K)
 481 A CPES.K=ICPES
 482 C ICPES=1
 483 A CPSS.K=ICPSS
 484 C ICPSS=2
 485 A CPCS.K=ICPCS
 486 C ICPCS=3
 487 A TCAE.K=((UES.K+LES.K)*CPES.K)+((USS.K+LSS.K)*CPSS.K)+
 488 X ((UCS.K+LCS.K)*CPCS.K)
 489 A EAGUAF.K=TABHL(TEGUAF,EEAGAF.K+EUAF.K,-1,1,.5)
 490 T TEGUAF=-1/-0.5/0/.5/1
 491 A EEAGAF.K=TABHL(TEAGAF,PEAG.K/NEAG,0,2,.25)
 492 T TEAGAF=.95/.8/.65/.35/0/-0.15/-0.3/-0.6/-0.85

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* 493 L PEAG,K=PEAG,J+(DT/TPEAG)(EAG,J-PEAG,J)
* 494 N PEAG=EAG
* 495 C TPEAG=6
* 496 R PCFAU,KL=PULSE(PFCA/DT,PFCT,PFCT)
* 497 C PFCA=.25
* 498 C PFCT=2E6
* 499 C PFCT=1E3
* 500 A EUAF,K=TABHL(TUAF,RUR,K,0,2,.25)
* 501 T TUAF=-1/-,.6/-,.3/-,.1/0/.25/.5/.75/1
* 502 A RUR,K=((UJET,K+UUST,K+UUCT,K)/(UJET,K+ULST,K+ULCT,K))/IFUR
* 503 N IFUR=(UJET+UUST+UUCT)/(UJET+ULST+ULCT)
* 504 A AEPUS,K=AEUS,K/TUS,K
* 505 A TUS,K=UES,K+USS,K+UCS,K
* 506 N IAEPUS=AEUS/TUS
* 507 A AELS,K=FAAE,K-AEUS,K
* 508 A AEPLS,K=AELS,K/TLS,K
* 509 A TLS,K=LES,K+LSS,K+LCS,K
* 510 N IAEPLS=AELS/TLS
* 511 A ERG,K=(AEUS,K/TUS,K)/((FAAE,K-AEUS,K)/TLS,K)
* 512 A RGI,K=ERG,K/IERG
* 513 N IERG=ERG
* 514 NOTE
* 515 NOTE
* 516 NOTE          SIMULATION CONTROLS
* 517 SPEC  DT=.1/PLTPER=1/PRTPER=0
* 518 N TIME=ITIME
* 519 C ITIME=1980
* 520 C LENGTH=2030
* 521 PLOT

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THIS IS A LIST OF DEFINITIONS FOR THE CER PROGRAM

AAUCC AVERAGE AGE UPON COMPLETION OF COLLEGE (YEARS)
AAUCES AVERAGE AGE UPON COMPLETION OF ELEMENTARY SCHOOL (YEARS)
AAUCSS AVERAGE AGE UPON COMPLETION OF SECONDARY SCHOOL (YEARS)
AELS AID-TO-EDUCATION FOR LOWER SOCIOECONOMIC STATUS STUDENTS (\$/YEAR)
AELPS AID-TO-EDUCATION PER LOWER SOCIOECONOMIC STATUS STUDENT (\$/PERSON/YEAR)
AEPUS AID-TO-EDUCATION PER UPPER SOCIOECONOMIC STATUS STUDENT (\$/PERSON/YEAR)
AEUS AID-TO-EDUCATION FOR UPPER SOCIOECONOMIC STATUS STUDENTS (\$/YEAR)
AF ALTERED FRACTION (%)
ALCT AVERAGE LIFETIME OF COLLEGE TERMINATORS (YEARS)
ALELCT AVERAGE LENGTH OF EMPLOYMENT OF LOWER SOCIOECONOMIC STATUS COLLEGE
TERMINATORS (YEARS)
ALELET AVERAGE LENGTH OF EMPLOYMENT OF LOWER SOCIOECONOMIC STATUS ELEMENTARY
TERMINATORS (YEARS)
ALFLST AVERAGE LENGTH OF EMPLOYMENT OF LOWER SOCIOECONOMIC STATUS SECONDARY
TERMINATORS (YEARS)
ALET AVERAGE LIFETIME OF ELEMENTARY TERMINATORS (YEARS)
ALFKT AVERAGE LENGTH OF EMPLOYMENT OF UPPER SOCIOECONOMIC STATUS COLLEGE
TERMINATORS (YEARS)
ALEUT AVERAGE LENGTH OF EMPLOYMENT FOR UPPER SOCIOECONOMIC STATUS ELEMENTARY
TERMINATORS (YEARS)
ALEUST AVERAGE LENGTH OF EMPLOYMENT FOR UPPER SOCIOECONOMIC STATUS SECONDARY
TERMINATORS (YEARS)
ALS APTITUDE OF LOWER SOCIOECONOMIC STUDENTS (YEARS)
ALST AVERAGE LIFETIME OF SECONDARY TERMINATORS (YEARS)
APTITUDE OF LOWER SOCIOECONOMIC STUDENTS (YEARS)
AUS APTITUDE OF UPPER SOCIOECONOMIC STATUS STUDENTS (YEARS)
AYCG AVERAGE YEARS PER COLLEGE GRADUATE (YEARS)
AYCT AVERAGE YEARS PER COLLEGE TERMINATOR (YEARS)
AYET AVERAGE YEARS PER ELEMENTARY TERMINATOR (YEARS)
AYST AVERAGE YEARS PER SECONDARY TERMINATOR (YEARS)
CALC CHANGE IN APTITUDE OF LOWER SOCIOECONOMIC STUDENTS (YEARS/YEAR)
CAUS CHANGE IN APTITUDE OF UPPER SOCIOECONOMIC STUDENTS (YEARS/YEAR)
CC COLLEGE CAPACITY (PEOPLE)
CCC CHANGE IN COLLEGE CAPACITY (PEOPLE/YEAR)
CCSS CHANGE IN CAPACITY OF THE ELEMENTARY SCHOOL SYSTEM (PEOPLE/YEAR)
CCSSS CHANGE IN CAPACITY OF THE SECONDARY SCHOOL SYSTEM (PEOPLE/YEAR)
CESS CAPACITY OF ELEMENTARY SCHOOL SYSTEM (PEOPLE)
CFACAU CHANGE IN FRACTION OF AID TO EDUCATION ALLOCATED TO UPPER SOCIOECONOMIC
STATUS (%/YEAR)
CLIP DYNAND FUNCTION FOR SWITCHING IN A TEST
CS COLLEGE STUDENTS (PEOPLE)
CSCL CHANGE IN STANDARDS AT THE COLLEGE LEVEL (YEARS/YEAR)
CSEL CHANGE IN STANDARDS AT THE ELEMENTARY LEVEL (YEARS/YEAR)
CSLS CHANGE IN STANDARDS AT THE SECONDARY LEVEL (YEARS/YEAR)
CSSS CAPACITY OF THE SECONDARY SCHOOL SYSTEM (PEOPLE)
DJCT DECREASE IN JOBS FOR COLLEGE TERMINATORS (PEOPLE/YEAR)
DJET DECREASE IN JOBS FOR ELEMENTARY TERMINATORS (PEOPLE/YEAR)
DJST DECREASE IN JOBS FOR SECONDARY TERMINATORS (PEOPLE/YEAR)
DT CALCULATION INTERVAL (YEARS)
EACCC EFFECT OF AGE CONSIDERATIONS ON ENTRY INTO COLLEGE (DIMENSIONLESS)
EACGC EFFECT OF AGE CONSIDERATIONS ON GRADUATION FROM COLLEGE (DIMENSIONLESS)

EACTJC EFFECT OF AVAILABILITY OF COLLEGE TERMINATORS ON JOB CREATION
(DIMENSIONLESS)
EACTJC EFFECT OF AVAILABILITY OF ELEMENTARY TERMINATORS ON JOB CREATION
(DIMENSIONLESS)
EAG EDUCATIONAL ATTAINMENT GAP (YEARS)
EASTJC EFFECT OF AVAILABILITY OF SECONDARY AND COLLEGE TERMINATORS ON JOB
CREATION (DIMENSIONLESS)
EASTJC EFFECT OF AVAILABILITY OF SECONDARY TERMINATORS ON JOB CREATION
(DIMENSIONLESS)
ECC EFFECT OF COLLEGE CAPACITY (DIMENSIONLESS)
EEAGAP EFFECT OF EDUCATIONAL ATTAINMENT GAP ON ALLOCATION FRACTION
(DIMENSIONLESS)
EEC EFFECT OF ELEMENTARY CAPACITY (DIMENSIONLESS)
EJALCT EFFECT OF JOBS ON ABSORPTION OF LOWER SOCIOECONOMIC STATUS
COLLEGE TERMINATORS (DIMENSIONLESS)
EJALCT EFFECT OF JOBS ON ABSORPTION OF LOWER SOCIOECONOMIC STATUS ELEMENTARY
TERMINATORS (DIMENSIONLESS)
EJALST EFFECT OF JOBS ON ABSORPTION OF LOWER SOCIOECONOMIC STATUS SECONDARY
TERMINATORS (DIMENSIONLESS)
EJAUCT EFFECT OF JOBS ON ABSORPTION OF UPPER SOCIOECONOMIC STATUS
COLLEGE TERMINATORS (DIMENSIONLESS)
EJAUCT EFFECT OF JOBS ON ABSORPTION OF UPPER SOCIOECONOMIC STATUS ELEMENTARY
TERMINATORS (DIMENSIONLESS)
EJAUST EFFECT OF JOBS ON ABSORPTION OF UPPER SOCIOECONOMIC STATUS SECONDARY
TERMINATORS (DIMENSIONLESS)
EJLLCT EFFECT OF JOBS ON LENGTH OF EMPLOYMENT OF LOWER SOCIOECONOMIC STATUS
COLLEGE TERMINATORS (DIMENSIONLESS)
EJLLET EFFECT OF JOBS ON LENGTH OF EMPLOYMENT OF LOWER SOCIOECONOMIC STATUS
ELEMENTARY TERMINATORS (DIMENSIONLESS)
EJLLST EFFECT OF JOBS ON LENGTH OF EMPLOYMENT OF LOWER SOCIOECONOMIC STATUS
SECONDARY TERMINATORS (DIMENSIONLESS)
EJLUCT EFFECT OF JOBS ON LENGTH OF EMPLOYMENT OF UPPER SOCIOECONOMIC STATUS
COLLEGE TERMINATORS (DIMENSIONLESS)
EJLUET EFFECT OF JOBS ON LENGTH OF EMPLOYMENT OF UPPER SOCIOECONOMIC STATUS
ELEMENTARY TERMINATORS (DIMENSIONLESS)
EJUST EFFECT OF JOBS ON LENGTH OF EMPLOYMENT FOR UPPER SOCIOECONOMIC STATUS
SECONDARY TERMINATORS (DIMENSIONLESS)
ELCT EMPLOYMENT OF LOWER SOCIOECONOMIC STATUS COLLEGE TERMINATORS (PEOPLE/YEAR)
ELC EQUILIBRIUM LOWER SOCIOECONOMIC STATUS ENTRY (PEOPLE/YEAR)
ELES EQUILIBRIUM LOWER SOCIOECONOMIC STATUS ENTRY INTO ELEMENTARY SCHOOL
(PEOPLE/YEAR)
ELET EMPLOYMENT OF LOWER SOCIOECONOMIC STATUS ELEMENTARY TERMINATORS (PEOPLE)
ELST EMPLOYMENT OF LOWER SOCIOECONOMIC STATUS SECONDARY TERMINATORS (PEOPLE)
ERAT EFFECT OF REDUCTION IN ABSORPTION TIME (DIMENSIONLESS)
ES EQUILIBRIUM SWITCH (DIMENSIONLESS)
ESC EFFECT OF SECONDARY CAPACITY (DIMENSIONLESS)
ESLC EFFECT OF STANDARDS ON LOWER SOCIOECONOMIC STATUS ENTERING COLLEGE
(DIMENSIONLESS)
ESLES EFFECT OF STANDARDS ON LOWER SOCIOECONOMIC STATUS ENTRY INTO SECONDARY
SCHOOL (DIMENSIONLESS)
ESLGC EFFECT OF STANDARDS ON LOWER SOCIOECONOMIC STATUS GRADUATING FROM
COLLEGE (DIMENSIONLESS)
ESS ELEMENTARY SCHOOL STUDENTS (PEOPLE)
ESUEC EFFECT OF STANDARDS ON UPPER SOCIOECONOMIC STATUS ENTRY INTO COLLEGE
(DIMENSIONLESS)

ESUESS EFFECT OF STANDARDS ON UPPER SOCIOECONOMIC STATUS ENTERING SECONDARY SCHOOL (DIMENSIONLESS)
ESUGC EFFECT OF STANDARDS ON UPPER SOCIOECONOMIC STATUS GRADUATING COLLEGE (DIMENSIONLESS)
EUCT EMPLOYMENT OF UPPER SOCIOECONOMIC STATUS COLLEGE TERMINATORS (PEOPLE/YEAR)
EUE EQUILIBRIUM UPPER SOCIOECONOMIC STATUS ENTRY (PEOPLE/YEAR)
EUEF EQUILIBRIUM UPPER SOCIOECONOMIC STATUS ENTRY INTO ELEMENTARY SCHOOL (PEOPLE/YEAR)
EUT EMPLOYMENT OF UPPER SOCIOECONOMIC STATUS ELEMENTARY TERMINATORS (PEOPLE)
EUST EMPLOYMENT OF UPPER SOCIOECONOMIC STATUS SECONDARY TERMINATORS (PEOPLE)
FAAE FUNDS ALLOCATED TO AID-TO-EDUCATION (%/YEAR)
FAFAUS FRACTION OF AID-TO-EDUCATION ALLOCATED TO UPPER SOCIOECONOMIC STATUS (%)
FAEF FRACTIONAL ALTERATION OF EDUCATIONAL FRACTION (%)
ICAEU FRACTIONAL CHANGE IN AID-TO-EDUCATION ALLOCATED TO UPPER SOCIOECONOMIC STATUS (%/YEAR)
FCCC FRACTIONAL CHANGE IN COLLEGE CAPACITY (%/YEAR)
FCCS FRACTIONAL CHANGE IN COLLEGE CAPACITY FROM SHORT-FALL (%/YEAR)
FCCSS FRACTIONAL CHANGE IN CAPACITY OF THE ELEMENTARY SCHOOL SYSTEM (%/YEAR)
FCCS FRACTIONAL CHANGE IN COLLEGE STANDARDS (%/YEAR)
FCCSC FRACTIONAL CHANGE IN COLLEGE STANDARDS FROM CAPACITY (%/YEAR)
FCCSG FRACTIONAL CHANGE IN COLLEGE STANDARDS FROM THE GAP (%/YEAR)
FCCSSS FRACTIONAL CHANGE IN THE CAPACITY OF THE SECONDARY SCHOOL SYSTEM (%/YEAR)
FCECS FRACTIONAL CHANGE IN ELEMENTARY CAPACITY FROM SHORT-FALL (%/YEAR)
FCESC FRACTIONAL CHANGE IN ELEMENTARY STANDARDS FROM CAPACITY (%/YEAR)
FCESG FRACTIONAL CHANGE IN ELEMENTARY STANDARDS FROM THE GAP (%/YEAR)
FCELEC FRACTIONAL CHANGE IN LOWER SES ENTRY INTO COLLEGE (%/YEAR)
FCSCS FRACTIONAL CHANGE IN SECONDARY CAPACITY FROM SHORT-FALL (%/YEAR)
FCSEL FRACTIONAL CHANGE IN STANDARDS AT THE ELEMENTARY LEVEL (%/YEAR)
FCSSC FRACTIONAL CHANGE IN SECONDARY STANDARDS FROM CAPACITY (%/YEAR)
FCSSG FRACTIONAL CHANGE IN SECONDARY STANDARDS FROM THE GAP (%/YEAR)
FCSSL FRACTIONAL CHANGE IN STANDARDS AT THE SECONDARY LEVEL (%/YEAR)
FGNPAP FRACTION OF GNP ALLOCATED TO AID-TO-EDUCATION (%)
FIJCT FRACTIONAL INCREASE IN JOBS FOR COLLEGE TERMINATORS (%/YEAR)
FIJET FRACTIONAL INCREASE IN JOBS FOR ELEMENTARY TERMINATORS (%/YEAR)
FIJST FRACTIONAL INCREASE IN JOBS FOR SECONDARY TERMINATORS (%/YEAR)
FLEY FRACTION OF LOWER SOCIOECONOMIC STATUS ENTERING COLLEGE PER YEAR (%/YEAR)
FLESSY FRACTION OF LOWER SOCIOECONOMIC STATUS ENTERING SECONDARY SCHOOL PER YEAR (%)
FLOCY FRACTION OF LOWER SOCIOECONOMIC STATUS GRADUATING COLLEGE PER YEAR (%)
FLIC FRACTION OF LOWER SOCIOECONOMIC STATUS TERMINATING COLLEGE PER YEAR (%)
FLTE FRACTION OF LOWER SOCIOECONOMIC STATUS TERMINATING AT ELEMENTARY LEVEL PER YEAR (%)
FLIS FRACTION OF LOWER SOCIOECONOMIC STATUS TERMINATING AT SECONDARY LEVEL PER YEAR (%)
FPLAC FRACTION OF PRODUCTIVE LIFE SPENT ACQUIRING A COLLEGE EDUCATION (%)
FPLAE FRACTION OF PRODUCTIVE LIFE SPENT ACQUIRING ELEMENTARY EDUCATION (%)
FPLASE FRACTION OF PRODUCTIVE LIFE SPENT ACQUIRING SECONDARY EDUCATION (%)
FUECY FRACTION OF MAXIMUM UPPER SOCIOECONOMIC STATUS ENTERING COLLEGE PER YEAR (%)
FUESSY FRACTION OF UPPER SOCIOECONOMIC STATUS ENTERING SECONDARY SCHOOL PER YEAR (%)
FUCY FRACTION OF UPPER SOCIOECONOMIC STATUS GRADUATING COLLEGE PER YEAR (%)
FUTC FRACTION OF UPPER SOCIOECONOMIC STATUS TERMINATING COLLEGE (%/YEAR)
FUTE FRACTION OF UPPER SOCIOECONOMIC STATUS TERMINATING AT THE ELEMENTARY LEVEL (%/YEAR)

FUTS FRACTION OF UPPER SOCIOECONOMIC STATUS TERMINATING SECONDARY SCHOOL
 (%/YEAR)
 GNP GROSS NATIONAL PRODUCT (\$/YEAR)
 HLEES HISTORICAL LOWER SOCIOECONOMIC STATUS ENTRY INTO ELEMENTARY SCHOOL
 (PEOPLE/YEAR)
 HUEES HISTORICAL UPPER SOCIOECONOMIC STATUS ENTRY INTO ELEMENTARY SCHOOL
 (PEOPLE/YEAR)
 IAEPLS INITIAL AID-TO-EDUCATION PER LOWER SOCIOECONOMIC STATUS STUDENT
 (\$/PERSON)
 IAEPUIS INITIAL AID-TO-EDUCATION PER UPPER SOCIOECONOMIC STATUS STUDENT
 (\$/PERSON)
 IALS INDICATED APTITUDE OF LOWER SOCIOECONOMIC STATUS STUDENTS (YEARS)
 IAUS INDICATED APTITUDE OF UPPER SOCIOECONOMIC STUDENTS (YEARS)
 IBTU INITIAL BIAS TOWARD UPPER SOCIOECONOMIC STATUS (DIMENSIONLESS)
 IEAG INDEX OF EDUCATIONAL ATTAINMENT GAP (DIMENSIONLESS)
 IFELS INITIAL EQUILIBRIUM LOWER SOCIOECONOMIC STATUS STUDENTS (PEOPLE)
 IFELSS INITIAL EQUILIBRIUM LOWER SOCIOECONOMIC STATUS STUDENTS (PEOPLE)
 IFELCS INITIAL EQUILIBRIUM UPPER SOCIOECONOMIC STATUS COLLEGE STUDENTS (PEOPLE)
 IFELSSS INITIAL EQUILIBRIUM UPPER SOCIOECONOMIC STATUS ELEMENTARY STUDENTS
 (PEOPLE)
 IF INITIAL FRACTION (%)
 IFALAU INDICATED FRACTION OF AID-TO-EDUCATION ALLOCATED TO UPPER SOCIOECONOMIC
 STATUS STUDENTS (%)
 IFALUS INITIAL FRACTION ALLOCATED TO UPPER SOCIOECONOMIC STATUS STUDENTS (%)
 IFELCT INITIAL FRACTION OF EMPLOYED WHO ARE LOWER SOCIOECONOMIC STATUS
 COLLEGE TERMINATORS (%)
 IFELCT INITIAL FRACTION OF EMPLOYED WHO ARE LOWER SOCIOECONOMIC STATUS
 ELEMENTARY TERMINATORS (%)
 IFELST INITIAL FRACTION OF EMPLOYED WHO ARE LOWER SOCIOECONOMIC STATUS
 SECONDARY TERMINATORS (%)
 IFELCT INITIAL FRACTION OF EMPLOYED WHO ARE UPPER SOCIOECONOMIC STATUS
 COLLEGE TERMINATORS (%)
 IFELCT INITIAL FRACTION OF EMPLOYED WHO ARE UPPER SOCIOECONOMIC STATUS
 ELEMENTARY TERMINATORS (%)
 IFELST INITIAL FRACTION OF EMPLOYED WHO ARE UPPER SOCIOECONOMIC STATUS
 SECONDARY TERMINATORS (%)
 IFULCT INITIAL FRACTION OF UNEMPLOYED WHO ARE LOWER SOCIOECONOMIC STATUS
 COLLEGE TERMINATORS (%)
 IFULCT INITIAL FRACTION OF UNEMPLOYED WHO ARE LOWER SOCIOECONOMIC STATUS
 ELEMENTARY TERMINATORS (%)
 IFULST INITIAL FRACTION OF UNEMPLOYED WHO ARE LOWER SOCIOECONOMIC STATUS
 SECONDARY TERMINATORS (%)
 IFULCT INITIAL FRACTION OF UNEMPLOYED WHO ARE UPPER SOCIOECONOMIC STATUS
 COLLEGE TERMINATORS (%)
 IFULCT INITIAL FRACTION OF UNEMPLOYED WHO ARE UPPER SOCIOECONOMIC STATUS
 ELEMENTARY TERMINATORS (%)
 IFULST INITIAL FRACTION OF UNEMPLOYED WHO ARE UPPER SOCIOECONOMIC STATUS
 SECONDARY TERMINATORS (%)
 IJCT INCREASE IN JOBS FOR COLLEGE TERMINATORS (PEOPLE/YEAR)
 IJCT INCREASE IN JOBS FOR ELEMENTARY TERMINATORS (PEOPLE/YEAR)
 IJST INCREASE IN JOBS FOR SECONDARY TERMINATORS (PEOPLE/YEAR)
 INLCS INITIAL NON-EQUILIBRIUM LOWER SOCIOECONOMIC STATUS STUDENTS (PEOPLE)
 INLSS INITIAL NON-EQUILIBRIUM LOWER SOCIOECONOMIC STATUS STUDENTS (PEOPLE)
 INUCS INITIAL NON-EQUILIBRIUM UPPER SOCIOECONOMIC STATUS COLLEGE STUDENTS
 (PEOPLE)

INUSS INITIAL NON-EQUILIBRIUM UPPER SOCIOECONOMIC STATUS SECONDARY STUDENTS (PEOPLE)
ITELF INITIAL TOTAL EMPLOYED LABOR FORCE (PEOPLE)
ITIME INITIAL TIME (YEAR)
ITNGF INITIAL TOTAL NON-GRADUATE-SCHOOL LABOR FORCE (PEOPLE)
ITULF INITIAL TOTAL UNEMPLOYED LABOR FORCE (PEOPLE)
IUECT INITIAL UNEMPLOYMENT OF ELEMENTARY TERMINATORS (DIMENSIONLESS)
IUF INITIAL UNEMPLOYMENT FRACTION (%)
IUECT INITIAL UNEMPLOYMENT RATE FOR COLLEGE TERMINATORS (DIMENSIONLESS)
IUECT INITIAL UNEMPLOYMENT RATE FOR SECONDARY AND COLLEGE TERMINATORS (DIMENSIONLESS)
IUECT INITIAL UNEMPLOYMENT RATE FOR SECONDARY TERMINATORS (DIMENSIONLESS)
JCT JOBS FOR COLLEGE TERMINATORS (PEOPLE)
JCT JOBS FOR ELEMENTARY TERMINATORS (PEOPLE)
JST JOBS FOR SECONDARY TERMINATORS (PEOPLE)
LGG LOWER SOCIOECONOMIC STATUS COLLEGE GRADUATES (PEOPLE)
LGGD LOWER SOCIOECONOMIC STATUS COLLEGE GRADUATE DEATHS (PEOPLE/YEAR)
LGGR LOWER SOCIOECONOMIC STATUS COLLEGE GRADUATION RATE (PEOPLE/YEAR)
LGS LOWER SOCIOECONOMIC STATUS COLLEGE STUDENTS (PEOPLE)
LGT LOWER SOCIOECONOMIC STATUS COLLEGE TERMINATORS (PEOPLE)
LEA LOWER SOCIOECONOMIC STATUS EDUCATIONAL ATTAINMENT (YEARS)
LEC LOWER SOCIOECONOMIC STATUS ENTRY INTO COLLEGE (PEOPLE/YEAR)
LECT LOWER SOCIOECONOMIC STATUS EMPLOYED COLLEGE TERMINATORS (PEOPLE)
LECTD LOWER SOCIOECONOMIC STATUS EMPLOYED COLLEGE TERMINATOR DEATHS (PEOPLE/YEAR)
LEES LOWER SOCIOECONOMIC STATUS ENTRY INTO ELEMENTARY SCHOOL (PEOPLE/YEAR)
LEET LOWER SOCIOECONOMIC STATUS EMPLOYED ELEMENTARY TERMINATORS (PEOPLE)
LEETD LOWER SOCIOECONOMIC STATUS EMPLOYED ELEMENTARY TERMINATOR DEATHS (PEOPLE/YEAR)
LENGTH LENGTH OF SIMULATION (YEARS)
LES LOWER SOCIOECONOMIC STATUS ELEMENTARY STUDENTS (PEOPLE)
LESS LOWER SOCIOECONOMIC STATUS ENTRY INTO SECONDARY SCHOOL (PEOPLE/YEAR)
LEST LOWER SOCIOECONOMIC STATUS EMPLOYED SECONDARY TERMINATORS (PEOPLE)
LESTD LOWER SOCIOECONOMIC STATUS EMPLOYED SECONDARY TERMINATOR DEATHS (PEOPLE/YEAR)
LETR LOWER SOCIOECONOMIC STATUS ELEMENTARY TERMINATION RATE (PEOPLE/YEAR)
LPEA LOWER SOCIOECONOMIC STATUS PARENTAL EDUCATIONAL ATTAINMENT (YEARS)
LPEEA LOWER SOCIOECONOMIC STATUS PARENTAL EXPECTATION WITH RESPECT TO EDUCATIONAL ATTAINMENT (YEARS)
LPEF LOWER SOCIOECONOMIC STATUS EXPECTATION FACTOR (YEARS)
LPL LENGTH OF PRODUCTIVE LIFE (YEARS)
LSS LOWER SOCIOECONOMIC STATUS SECONDARY STUDENTS (PEOPLE)
LSTR LOWER SOCIOECONOMIC STATUS SECONDARY TERMINATION RATE (PEOPLE/YEAR)
MFECC MAXIMUM FRACTION ENTERING COLLEGE PER YEAR (%/YEAR)
MFECC MAXIMUM FRACTION ENTERING SECONDARY SCHOOL PER YEAR (%/YEAR)
MFGCY MAXIMUM FRACTION GRADUATING COLLEGE PER YEAR (%/YEAR)
NEAG NORMAL EDUCATIONAL ATTAINMENT GAP (YEARS)
NFIJCT NORMAL FRACTIONAL INCREASE IN JOBS FOR COLLEGE TERMINATORS (%/YEAR)
NFIJCT NORMAL FRACTIONAL INCREASE IN JOBS FOR ELEMENTARY TERMINATORS (%/YEAR)
NFIJST NORMAL FRACTIONAL INCREASE IN JOBS FOR SECONDARY TERMINATORS (%/YEAR)
NLELCT NORMAL LENGTH OF EMPLOYMENT OF LOWER SOCIOECONOMIC STATUS COLLEGE TERMINATORS (YEARS)
NLELET NORMAL LENGTH OF EMPLOYMENT OF LOWER SOCIOECONOMIC STATUS ELEMENTARY TERMINATORS (YEARS)
NLELST NORMAL LENGTH OF EMPLOYMENT OF LOWER SOCIOECONOMIC STATUS SECONDARY

TERMINATORS (YEARS)
NLEUT NORMAL LENGTH OF EMPLOYMENT FOR UPPER SOCIOECONOMIC STATUS COLLEGE
TERMINATORS (YEARS)
NLEUT NORMAL LENGTH OF EMPLOYMENT OF UPPER SOCIOECONOMIC STATUS ELEMENTARY
TERMINATORS (YEARS)
NLEUT NORMAL LENGTH OF EMPLOYMENT FOR UPPER SOCIOECONOMIC STATUS SECONDARY
TERMINATORS (YEARS)
NPMLEF NORMAL PERCENT OF MAXIMUM LOWER SOCIOECONOMIC STATUS ENTERING
COLLEGE (%)
NPMLES NORMAL PERCENT OF MAXIMUM LOWER SOCIOECONOMIC STATUS ENTERING
SECONDARY SCHOOL (%)
NPMLEG NORMAL PERCENT OF MAXIMUM LOWER SOCIOECONOMIC STATUS GRADUATING
COLLEGE (%)
NPMUEC NORMAL PERCENT OF MAXIMUM UPPER SOCIOECONOMIC STATUS ENTERING
COLLEGE (%)
NPMUES NORMAL PERCENT OF MAXIMUM UPPER SOCIOECONOMIC STATUS ENTERING
SECONDARY SCHOOL (%)
NPMUEG NORMAL PERCENT OF MAXIMUM UPPER SOCIOECONOMIC STATUS GRADUATING
COLLEGE (%)
NTALET NORMAL TIME TO ABSORB LOWER SOCIOECONOMIC STATUS COLLEGE TERMINATORS
(YEARS)
NTALEI NORMAL TIME TO ABSORB LOWER SOCIOECONOMIC STATUS ELEMENTARY
TERMINATORS (YEARS)
NTALEST NORMAL TIME TO ABSORB LOWER SOCIOECONOMIC STATUS SECONDARY
TERMINATORS (YEARS)
NTAUCT NORMAL TIME TO ABSORB UPPER SOCIOECONOMIC COLLEGE TERMINATORS (YEARS)
NTAUET NORMAL TIME TO ABSORB UPPER SOCIOECONOMIC STATUS ELEMENTARY
TERMINATORS (YEARS)
NTAUST NORMAL TIME TO ABSORB UPPER SOCIOECONOMIC STATUS SECONDARY
TERMINATORS (YEARS)
PALEEC PERCENT FROM AID-TO-EDUCATION ON LOWER SOCIOECONOMIC STATUS ENTERING
COLLEGE (%)
PAFLES PERCENT FROM AID-TO-EDUCATION FOR LOWER SOCIOECONOMIC STATUS
ELEMENTARY STUDENTS (%)
PAELGC PERCENT FROM AID-TO-EDUCATION ON LOWER SOCIOECONOMIC STATUS
GRADUATING COLLEGE (%)
PAEUEC PERCENT FROM AID-TO-EDUCATION ON UPPER SOCIOECONOMIC STATUS ENTRY
INTO COLLEGE (%)
PAEUES PERCENT FROM AID-TO-EDUCATION ON UPPER SOCIOECONOMIC STATUS ENTERING
SECONDARY SCHOOL (%)
PAEUEG PERCENT FROM AID-TO-EDUCATION FOR UPPER SOCIOECONOMIC STATUS
GRADUATING COLLEGE (%)
PCALT PULSE CHANGE IN APTITUDE OF LOWER SES TIME (YEAR)
PCFAU PULSE CHANGE IN FRACTION OF AID-TO-EDUCATION ALLOCATED TO UPPER
SOCIOECONOMIC STATUS STUDENTS (%)
PEAG PERCEIVED EDUCATIONAL ATTAINMENT GAP (YEARS)
PFCA PULSE FRACTIONAL CHANGE IN ALLOCATION (%)
PFCI PULSE FRACTIONAL CHANGE INTERVAL (YEARS)
PFCT PULSE FRACTIONAL CHANGE TIME (YEAR)
PJLEEC PERCENT FROM JOBS ON LOWER SOCIOECONOMIC STATUS ENTRY INTO COLLEGE (%)
PJLES PERCENT FROM JOBS FOR LOWER SOCIOECONOMIC STATUS ENTERING SECONDARY
SCHOOL (%)
PJLGC PERCENT FROM JOBS ON LOWER SOCIOECONOMIC STATUS GRADUATING FROM
COLLEGE (%)
PJUEC PERCENT FROM JOBS ON UPPER SOCIOECONOMIC STATUS ENTRY INTO COLLEGE (%)

PJUES PERCENT FROM JOBS ON UPPER SOCIOECONOMIC STATUS ENTERING SECONDARY SCHOOL (%)
 PJUGC PERCENT FROM JOBS FOR UPPER SOCIOECONOMIC STATUS GRADUATING COLLEGE (%)
 PLTPR PLOTTING PERIOD (YEARS)
 PMLLC PERCENT OF MAXIMUM LOWER SOCIOECONOMIC STATUS ENTERING COLLEGE (%)
 PMLECN PERCENT OF MAXIMUM LOWER SOCIOECONOMIC STATUS ENTERING COLLEGE NON-EQUILIBRIUM (%)
 PMLESN PERCENT OF MAXIMUM LOWER SOCIOECONOMIC STATUS ENTERING SECONDARY SCHOOL NON-EQUILIBRIUM (%)
 PMLESS PERCENT OF MAXIMUM LOWER SOCIOECONOMIC STATUS ENTERING SECONDARY SCHOOL (%)
 PMLGC PERCENT OF MAXIMUM LOWER SOCIOECONOMIC STATUS GRADUATING COLLEGE (%)
 PMLGCN PERCENT OF MAXIMUM LOWER SOCIOECONOMIC STATUS GRADUATING COLLEGE NON-EQUILIBRIUM (%)
 PMUEC PERCENT OF MAXIMUM UPPER SOCIOECONOMIC STATUS ENTERING COLLEGE PER YEAR (%)
 PMUECN PERCENT OF MAXIMUM UPPER SOCIOECONOMIC STATUS ENTERING COLLEGE NON-EQUILIBRIUM (%)
 PMUESN PERCENT OF MAXIMUM UPPER SOCIOECONOMIC STATUS ENTERING SECONDARY SCHOOL NON-EQUILIBRIUM (%)
 PMUESS PERCENT OF MAXIMUM UPPER SOCIOECONOMIC STATUS ENTERING SECONDARY SCHOOL (%)
 PMUGC PERCENT OF MAXIMUM UPPER SOCIOECONOMIC STATUS GRADUATING COLLEGE (%)
 PMUGCN PERCENT OF MAXIMUM UPPER SOCIOECONOMIC STATUS GRADUATING COLLEGE NON-EQUILIBRIUM (%)
 PULSE DYNAMO FUNCTION FOR A PULSE-TRANSFER
 RGI RESOURCE GAP INDEX (DIMENSIONLESS)
 SCCC SWITCH FOR CONSTANT COLLEGE CAPACITY (DIMENSIONLESS)
 SCEC SWITCH FOR CONSTANT ELEMENTARY CAPACITY (DIMENSIONLESS)
 SCL STANDARDS AT THE COLLEGE LEVEL (YEARS)
 SCSC SWITCH FOR CONSTANT SECONDARY CAPACITY (DIMENSIONLESS)
 SEL STANDARDS AT THE ELEMENTARY LEVEL (YEARS)
 SEI STANDARDS AT THE SECONDARY LEVEL (YEARS)
 SSS SECONDARY SCHOOL STUDENTS (PEOPLE)
 SWITCH DYNAMO FUNCTION FOR SWITCHING IN TESTS OR POLICIES
 TABDL DYNAMO FUNCTION FOR ESTABLISHING BI-VARIATE TABULAR RELATIONSHIP
 TABDL DYNAMO FUNCTION FOR ESTABLISHING BI-VARIATE TABULAR RELATIONSHIP
 TACLPE TIME TO ACTIVATE CHANGE IN LOWER SES PARENTAL EXPECTATIONS (YEAR)
 TAAE TIME TO AVERAGE EDUCATIONAL ATTAINMENT (YEARS)
 TAFGNP TIME TO ALTER FRACTION OF GNP (YEAR)
 TALCT TIME TO ABSORB LOWER SOCIOECONOMIC STATUS COLLEGE TERMINATORS (YEARS)
 TALECN TIME TO ABSORB LOWER SOCIOECONOMIC STATUS COLLEGE TERMINATORS NON-EQUILIBRIUM (YEARS)
 TALET TIME TO ABSORB LOWER SOCIOECONOMIC STATUS ELEMENTARY TERMINATORS (YEARS)
 TALETN TIME TO ABSORB LOWER SOCIOECONOMIC STATUS ELEMENTARY TERMINATORS NON-EQUILIBRIUM (YEARS)
 TALST TIME TO ABSORB LOWER SOCIOECONOMIC STATUS SECONDARY TERMINATORS (YEARS)
 TALSTN TIME TO ABSORB LOWER SOCIOECONOMIC STATUS SECONDARY TERMINATORS NON-EQUILIBRIUM (YEARS)
 TAUCT TIME TO ABSORB UPPER SOCIOECONOMIC COLLEGE TERMINATORS (YEARS)
 TAUCTN TIME TO ABSORB UPPER SOCIOECONOMIC STATUS COLLEGE TERMINATORS NON-EQUILIBRIUM (YEARS)
 TAUET TIME TO ABSORB UPPER SOCIOECONOMIC STATUS ELEMENTARY TERMINATORS (YEARS)
 TAUETN TIME TO ABSORB UPPER SOCIOECONOMIC STATUS ELEMENTARY TERMINATORS NON-EQUILIBRIUM (YEARS)

TAUST TIME TO ABSORB UPPER SOCIOECONOMIC STATUS SECONDARY TERMINATORS (YEARS)
TAUSTN TIME TO ABSORB UPPER SOCIOECONOMIC STATUS SECONDARY TERMINATORS
NON-EQUILIBRIUM (YEARS)
TALS TIME TO CHANGE APTITUDE OF LOWER SOCIOECONOMIC STATUS STUDENTS (YEARS)
TAUS TIME TO CHANGE APTITUDE OF UPPER SOCIOECONOMIC STUDENTS (YEARS)
TEACA TABLE OF EFFECT OF AGE CONSIDERATIONS ON ADVANCEMENT
TEAGAF TABLE OF EFFECT OF ATTAINMENT GAP ON ALLOCATION FRACTION
TEANT TABLE OF EFFECT OF AVAILABILITY OF HIGHER TERMINATORS
TEAT TABLE OF EFFECT OF AVAILABLE TERMINATORS
TEC TABLE OF ELEMENTARY CAPACITY
TEJALT TABLE OF EFFECT OF JOBS ON ABSORPTION OF LOWER SOCIOECONOMIC STATUS
TERMINATORS
TEJALT TABLE OF EFFECT OF JOBS ON ABSORPTION OF UPPER SOCIOECONOMIC STATUS
TERMINATORS
TEJLE TABLE OF EFFECT OF JOBS ON LENGTH OF LOWER SOCIOECONOMIC STATUS
EMPLOYMENT
TEJLE TABLE OF EFFECT OF JOBS ON LENGTH OF EMPLOYMENT OF UPPER SOCIOECONOMIC
STATUS
TESG TABLE OF EFFECT OF STANDARDS ON GRADUATION
TECACU TABLE OF FRACTIONAL CHANGE IN AID-TO-EDUCATION FOR UPPER SOCIOECONOMIC
STATUS
TECCS TABLE OF FRACTIONAL CHANGE IN CAPACITY FROM SHORT-FALL
TECCSG TABLE OF FRACTIONAL CHANGE IN COLLEGE STANDARDS FROM THE GAP
TECCSG TABLE OF FRACTIONAL CHANGE IN ELEMENTARY STANDARDS FROM THE GAP
TECCS TABLE OF FRACTIONAL CHANGE IN STANDARDS FROM CAPACITY
TECCSG TABLE OF FRACTIONAL CHANGE IN SECONDARY STANDARDS FROM THE GAP
TGNP TABLE OF GN?
THLEES TABLE OF HISTORICAL LOWER SOCIOECONOMIC STATUS ENTRY INTO ELEMENTARY
SCHOOL
THLEES TABLE OF HISTORICAL UPPER SOCIOECONOMIC STATUS ENTRY INTO ELEMENTARY
SCHOOL
TIAPE TABLE OF INDICATED APTITUDE FROM PARENTAL EXPECTATION
TIFRAT TIME TO IMPLEMENT EFFECT OF REDUCTION IN ABSORPTION TIME (YEAR)
TIFCEC TIME TO IMPLEMENT FRACTIONAL CHANGE OF ENTRY INTO COLLEGE (YEAR)
TIME DYNAMO FUNCTION FOR RECORDING TIME
TLCT TERMINATION OF LOWER SOCIOECONOMIC STATUS COLLEGE TERMINATORS
(PEOPLE/YEAR)
TLET TERMINATION OF LOWER SOCIOECONOMIC STATUS ELEMENTARY TERMINATORS
(PEOPLE/YEAR)
TLF TOTAL LABOR FORCE (PEOPLE)
TLPL TABLE OF LENGTH OF PRODUCTIVE LIFE
TLS TOTAL LOWER SOCIOECONOMIC STATUS STUDENTS (PEOPLE)
TLST TERMINATION OF LOWER SOCIOECONOMIC STATUS SECONDARY TERMINATORS
(PEOPLE/YEAR)
TPAELC TABLE OF PERCENT FROM AID-TO-EDUCATION ON LOWER SOCIOECONOMIC STATUS
ENTERING COLLEGE
TPAELG TABLE OF PERCENT FROM AID-TO-EDUCATION ON LOWER SOCIOECONOMIC STATUS
GRADUATING COLLEGE
TPAELS TABLE OF PERCENT FROM AID-TO-EDUCATION ON LOWER SOCIOECONOMIC STATUS
ENTERING SECONDARY SCHOOL
TPAELC TABLE OF PERCENT FROM AID-TO-EDUCATION ON UPPER SOCIOECONOMIC STATUS
ENTERING COLLEGE
TPAELG TABLE OF PERCENT FROM AID-TO-EDUCATION ON UPPER SOCIOECONOMIC
GRADUATING COLLEGE
TPAELUS TABLE OF PERCENT FROM AID-TO-EDUCATION ON UPPER SOCIOECONOMIC STATUS

ENTERING SECONDARY SCHOOL
TPEAG TIME TO PERCEIVE EDUCATIONAL ATTAINMENT GAP (YEARS)
TPJEC TABLE OF PERCENT FROM JOBS ON LOWER SOCIOECONOMIC STATUS ENTERING
COLLEGE
TPJLS TABLE OF PERCENT FROM JOBS ON LOWER SOCIOECONOMIC STATUS ENTERING
SECONDARY SCHOOL
TPJLC TABLE OF PERCENT FROM JOBS ON LOWER SOCIOECONOMIC STATUS GRADUATING
COLLEGE
TPJUC TABLE OF PERCENT FROM JOBS ON UPPER SOCIOECONOMIC STATUS ENTRY INTO
COLLEGE
TPJUS TABLE OF PERCENT FROM JOBS ON UPPER SOCIOECONOMIC STATUS ENTERING
SECONDARY SCHOOL
TPJUCG TABLE OF PERCENT FROM JOBS ON UPPER SOCIOECONOMIC STATUS GRADUATING
COLLEGE
TTCA TABLE OF TIME TO CHANGE APTITUDE
TUCT TERMINATION OF UPPER SOCIOECONOMIC STATUS COLLEGE TERMINATORS (PEOPLE/YEAR)
TUT TERMINATION OF UPPER SOCIOECONOMIC STATUS ELEMENTARY TERMINATORS
(PEOPLE/YEAR)
TUS TOTAL UPPER SOCIOECONOMIC STATUS STUDENTS (PEOPLE)
TUST TERMINATION OF UPPER SOCIOECONOMIC STATUS SECONDARY TERMINATORS
(PEOPLE/YEAR)
UCG UPPER SOCIOECONOMIC STATUS COLLEGE GRADUATES (PEOPLE)
UCGD UPPER SOCIOECONOMIC STATUS COLLEGE GRADUATE DEATHS (PEOPLE/YEAR)
UCGR UPPER SOCIOECONOMIC STATUS COLLEGE GRADUATION RATE (PEOPLE/YEAR)
UCS UPPER SOCIOECONOMIC STATUS COLLEGE STUDENTS (PEOPLE)
UCT UPPER SOCIOECONOMIC STATUS COLLEGE TERMINATION RATE (PEOPLE/YEAR)
UCA UPPER SOCIOECONOMIC STATUS EDUCATIONAL ATTAINMENT (YEARS)
ULC UPPER SOCIOECONOMIC STATUS ENTRY INTO COLLEGE (PEOPLE/YEAR)
UCT UPPER SOCIOECONOMIC STATUS EMPLOYED COLLEGE TERMINATORS (PEOPLE)
UCTD UPPER SOCIOECONOMIC STATUS EMPLOYED COLLEGE TERMINATOR DEATHS
(PEOPLE/YEAR)
UES UPPER SOCIOECONOMIC STATUS ENTRY INTO ELEMENTARY SCHOOL (PEOPLE/YEAR)
UET UPPER SOCIOECONOMIC STATUS EMPLOYED ELEMENTARY TERMINATORS (PEOPLE)
UETD UPPER SOCIOECONOMIC STATUS EMPLOYED ELEMENTARY TERMINATOR DEATHS
(PEOPLE/YEAR)
UES UPPER SOCIOECONOMIC STATUS ELEMENTARY STUDENTS (PEOPLE)
UESS UPPER SOCIOECONOMIC STATUS ENTRY INTO SECONDARY SCHOOL (PEOPLE/YEAR)
UEST UPPER SOCIOECONOMIC STATUS EMPLOYED SECONDARY TERMINATORS (PEOPLE)
UESTD UPPER SOCIOECONOMIC STATUS EMPLOYED SECONDARY TERMINATOR DEATHS
(PEOPLE/YEAR)
UETE UPPER SOCIOECONOMIC STATUS ELEMENTARY TERMINATION RATE (PEOPLE/YEAR)
ULCT UNEMPLOYED LOWER SOCIOECONOMIC STATUS COLLEGE TERMINATORS (PEOPLE)
ULCTD UNEMPLOYED LOWER SOCIOECONOMIC STATUS COLLEGE TERMINATOR DEATHS
(PEOPLE/YEAR)
ULET UNEMPLOYED LOWER SOCIOECONOMIC STATUS ELEMENTARY TERMINATORS (PEOPLE)
ULETD UNEMPLOYED LOWER SOCIOECONOMIC STATUS ELEMENTARY TERMINATOR DEATHS
(PEOPLE/YEAR)
ULST UNEMPLOYED LOWER SOCIOECONOMIC STATUS SECONDARY TERMINATORS (PEOPLE)
ULSTD UNEMPLOYED LOWER SOCIOECONOMIC STATUS SECONDARY TERMINATOR DEATHS
(PEOPLE/YEAR)
UEPA UPPER SOCIOECONOMIC STATUS PARENTAL EDUCATIONAL ATTAINMENT (YEARS)
UEPEA UPPER SOCIOECONOMIC STATUS PARENTAL EXPECTATION WITH RESPECT TO
EDUCATIONAL ATTAINMENT (YEARS)
UEPF UPPER SOCIOECONOMIC STATUS EXPECTATION FACTOR (YEARS)
URCT UNEMPLOYMENT RATIO FOR COLLEGE TERMINATORS (DIMENSIONLESS)

URET UNEMPLOYMENT RATIO FOR ELEMENTARY TERMINATORS (DIMENSIONLESS)
URSET UNEMPLOYMENT RATIO FOR SECONDARY AND COLLEGE TERMINATORS (DIMENSIONLESS)
URST UNEMPLOYMENT RATIO FOR SECONDARY TERMINATORS (DIMENSIONLESS)
USS UPPER SOCIOECONOMIC STATUS SECONDARY STUDENTS (PEOPLE)
USTR UPPER SOCIOECONOMIC STATUS SECONDARY TERMINATION RATE (PEOPLE/YEAR)
UUCT UNEMPLOYED UPPER SOCIOECONOMIC STATUS COLLEGE TERMINATORS (PEOPLE)
UUCT UNEMPLOYED UPPER SOCIOECONOMIC STATUS COLLEGE TERMINATOR DEATHS
 (PEOPLE/YEAR)
UDET UNEMPLOYED UPPER SOCIOECONOMIC STATUS ELEMENTARY TERMINATORS (PEOPLE)
UDET UNEMPLOYED UPPER SOCIOECONOMIC STATUS ELEMENTARY TERMINATOR DEATHS
 (PEOPLE/YEAR)
DUST UNEMPLOYED UPPER SOCIOECONOMIC STATUS SECONDARY TERMINATORS (PEOPLE)
DUST UNEMPLOYED UPPER SOCIOECONOMIC STATUS SECONDARY TERMINATOR DEATHS
 (PEOPLE/YEAR)

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